The Chemical Age

VOL LXVII 11 OCTOBER 1952 No 1735

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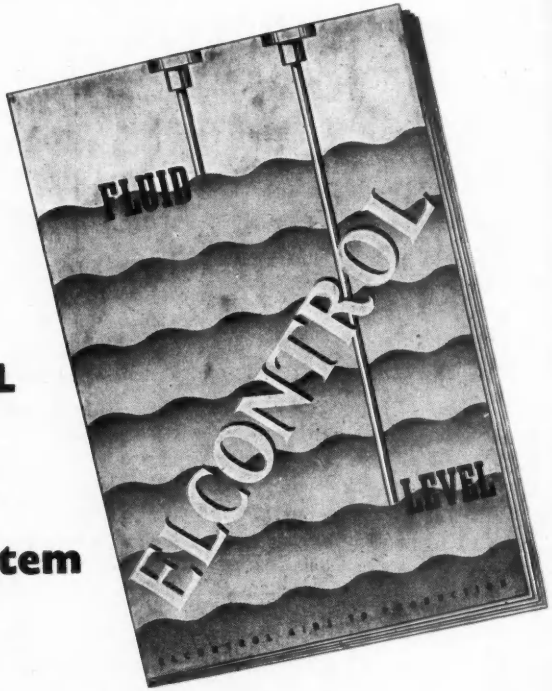
The ELCONTROL Fluid Level Control System



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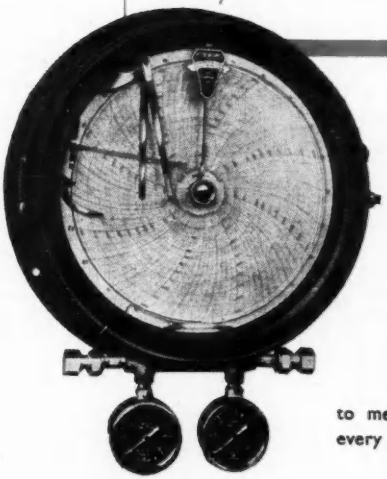

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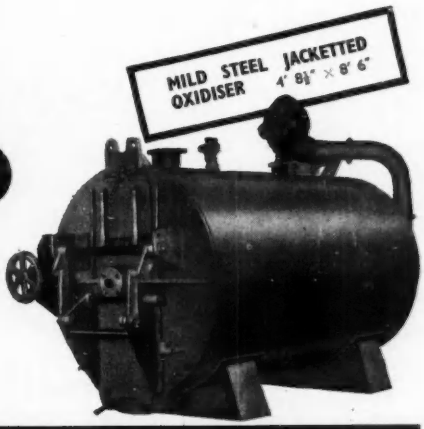

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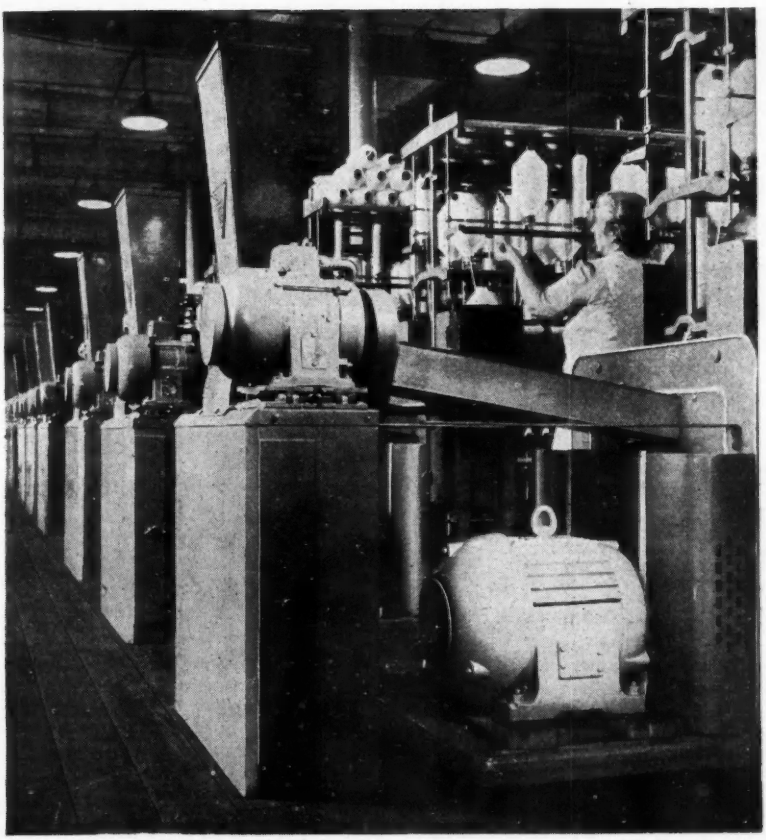

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Volume LXVII 11 October 1952 Number 1735

Atmospheric Pollution

IT is almost three centuries since John Evelyn's 'Fumifugium: or The Inconvenience of the Aer and Smoake of London Dissipated,' a tract or pamphlet in which its well-known author expressed himself with 'proper warmth and indignation against the absurd policy of allowing brewers, dyers, soap-boilers and lime-burners to intermix their noisome works among the dwelling-houses in the City and Suburbs.' Though the problem of gaseous and gritty effluents remains, perhaps nothing reveals more clearly the change in our general outlook towards it than a new book, 'Atmospheric Pollution,' (By A. R. Meetham, D.Sc. 1952. London. Pergammon Press Ltd., 268 pp. 35s. net.) in which the author surveys the subject without a vestige of John Evelyn's passion or indignation. The evils of atmospheric pollution are now accepted, the necessity to impose controls is recognised and legally expressed, the various means by which pollution can be safely minimised form a special branch of industrial technology. Dr. Meetham's quiet objectivity and moderate tone make a comment upon progress that is more emphatic than any of the statistics in his book. But it is clear enough that almost all this progress has been achieved in comparatively recent times, mainly within the past thirty years.

Dr. Meetham devotes most of his attention to the pollution caused by fuel combustion. It is evident that the extent to which we, or for that matter any country, can achieve freedom from smoke is intimately tied up with the policies and habits of fuel usage. The immediate atmospheres of our large cities and towns are still regularly polluted; no one who travels much in Britain could deny this. Today a number of scientific methods for measuring pollution exist and the weightiest chapter in the book is in fact devoted to these. We need not rely upon personal and subjective assessments for deciding whether this or that district air is bad or good or whether it is worse or better than it was 10 or 20 years previously. Thus, we know that in the period 1945-48 the air at Stoke-on-Trent contained 0.53 milligrams of smoke per cubic metre while in the same period that at Kew contained 0.16 mg/cubic metre. During the period of World War I 15.3 tons per month of gritty matter or insoluble ash fell per square mile upon London (Finsbury Park) but during World War II this had come down to 4.5; however, this is still nearly five times the figure for an area such as Rothamsted, Herts. The practical person will undoubtedly say that you cannot have industrial activity without

some effects upon environment and there must always be a limit to the possibilities of minimising these consequences. This is a reasonable enough view but it may dangerously encourage complacency.

Our progress towards smoke abatement, real though it is, has been remarkably though understandably unbalanced. Both by legal compulsion and public conscience, industry has made most of the contributions. It should not be forgotten that a single annual ton of smoke may be emitted by 120 domestic fires or by one small factory. Broadly speaking the factory stack is controlled and the household flue is not. Several hundred residents living close to a factory may sign an indignant petition about its smoke emission but accumulatively their own open fires in the winter may be causing greater air pollution. Though Dr. Meetham does not say so, it is a fair conclusion to draw from his book that we are near the point when greater industrial efforts to reduce pollution can make only a minor contribution towards the total smoke problem of a city or large town, when the hard remaining core of the problem is the winter pollution from household chimneys. Efforts to reduce industrial smoke emission have often yielded savings in fuel bills; it is only recently that the wastefulness of the open domestic fire as a means of providing heat has been much publicised.

Fortunately, all modern advances in domestic fuel economy—and there is a steadily expanding range of effective appliances—are much less productive of smoke as well as being less extravagant in fuel consumption. How rapidly will these better heating methods replace the present and poor methods? The high proportion of our coal output that must today be taken to feed inefficient domestic appliances constitutes a serious national liability, a costly drain upon our economy. Installations of better appliances in new houses is relatively simple; to instal them in existing houses is far more difficult. Indeed, Dr. Meetham considers that the second factor is the crux of the problem—'when the conversion of open fires in existing houses exceeds a few per cent per year, it can fairly be said that the end of the open fire as the chief British heating appliance will be in sight.' So, too, then will be the next substantial advance in smoke abatement.

As chemists, we may well stress the contribution made by smokeless fuels, classified by Dr. Meetham as 'artificial fuels.' In the ultimate, surely any national fuel usage policy must insist that all coal is processed as a raw chemical material leaving the carbonaceous residues for fuel purposes? Natural wealth can be substantially extracted before it is dissipated up chimneys and into the atmosphere, there to be diluted beyond all hope of recovery. Certainly it might be more often stressed that the open fire, with a suitably designed grate, can be smokeless and rather more efficient when pre-processed forms of coal are used.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 35s. Single copies, 9d.: post paid, 1s.; SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3954/5). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited.

Notes & Comments

New Field for Antibiotics?

THE audience at the recent annual meeting of the American Institute of Biological Sciences must have felt unusually privileged to hear Dr. Louis Nickell's paper, 'Plant Growth Stimulation by Antibiotics,' for this paper broke new ground indeed, and if further work confirms and expands the early experimental results described the paper must become historic. Minute amounts of certain antibiotics can induce plants to grow at faster rates. The effect of antibiotic trace supplements in feeding-stuffs for pigs and poultry would seem to be paralleled. Similar groups of 49 maize seeds were sown in two greenhouse plots. All conditions were identical except that the watering for one group was carried out with water containing five parts per million of terramycin. These results were obtained, the heading 'T' referring to the terramycin-treated section, 'C' referring to the other and control group.

	'T'	'C'
Percentage of seeds that germinated	Over 40%	Approx. 25%
Average height of plants at four weeks	44.32 cm.	35.56 cm.
Tallest plant at four weeks	60.96 cm.	49.53 cm.
Shortest plant at four weeks	24.77 cm.	15.24 cm.
Dry matter weight (average) per plant	5.1 grams.	2.4 grams.

Dr. Niskells also reported that similar stimulation of plant growth had been found in tests with sorrel and pansies. In the sorrel experiments the effect from early terramycin treatment persisted long afterwards; thus, 46 days after the cessation of treatment the treated plants averaged nearly 10 cms. taller than untreated plants. Penicillin—in the forms known as procaine and diamine—was mixed with soil (10 units per gram of soil) before sowing radish seed. Plants thus raised were about twice to three times the size of plants in untreated soil.

Choice Logical

IN attempts to find out whether antibiotics can influence plant growth the choice of terramycin is, of course, logical. Unlike most other antibiotics it is derived from a mould of soil origin. It may in fact be one of the hitherto unexposed mechanisms of Nature, this 'catalysing' of plant growth metabolism by a chemical substance exuded in a soil mould's growth. Of course it is not yet known why an antibiotic should be able to stimulate growth in plants, but it seems a reasonable speculation to believe that nutrient assimilation is increased and hastened. Clearly there must be many more experiments before the full measure of this advance can be assessed. It remains to be seen whether effects obtained in small-scale greenhouse plots can also be obtained in the field. It must also be found whether all or most plants respond. But it is not too optimistic to say that the possibilities of development are immense. The advantages to be gained in countries where the growing season for most crops is short seem particularly promising. Dr. Nickell's paper is appearing in the *Proceedings of the Society for Experimental Biology and Medicine* (1952, **80**, 4). The research has been carried out in the phytochemistry laboratory of Chas. Pfizer & Co., Inc., Brooklyn, New York, the pharmaceutical firm whose scientists discovered terramycin. It is said that these experiments with plants started in 1948.

Clashing of Symbols?

INCREASING attention to new systems of chemical notation will have been observed by most chemical readers since the war. There is little doubt that the widening field and rising complexity of organic chemistry create a demand for something simpler than the time-honoured system that has evolved from the earliest days of atomic and molecular theories. What has long been satisfactory for inorganic substances and the smaller organic compounds is not so generally satisfactory for complex macromolecules. Academic minds may abhor such heretic views; but the demand for change exists and indeed expresses itself in the contractions that come quickly into regular use for modern organic industrial or medicinal compounds, e.g., DDT, PAS,

TEPP, etc. In this country Dyson has devoted much time and effort towards developing a new and simpler notation system. A venture in the same direction has come from America—the Wiswesser system. British readers will find a very ample account of this system in *Chemical & Engineering News* (1952, 30, 34, 3523-3526).

Main Feature Economy

THE principal feature of Wiswesser's system seems to lie in its economy. On a survey of 650 compounds, selected at random from Beilstein, the average number of symbols needed per compound was 12.93 — the same test applied to the Dyson system gave an average of 27.45. The basis of the Wiswesser system is line formulation coupled with new symbols for frequently encountered structural groups, e.g., Q for the OH group, R for the benzine ring, M for the NH group. There is no space to describe here the Wiswesser system in detail but some examples of its economy in operation may be quoted as follows:—

$CH_3-CO.NH-C_6H_5$, acetanilide = 1VMR

$NH_2-CO.NH-NH-CO.NH_2$, biurea = ZVMMVZ

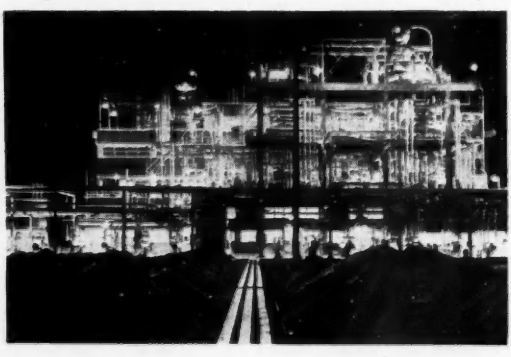
$O:CHCH:CH-C_6H_5$, cinnamaldehyde = O:2:1R

It is claimed that this new system also covers all known cyclic molecules without any possibility of positional confusion—a single rule deals with positional points of fusion. However, it is admitted that here the new system is not easy to explain though the difficulties disappear when the system is operated. The account given in the American article seems worthy of close study by British chemists. Within another generation the demand for a simpler system will inevitably expand and it is not too early now to subject all such proposals to random tests. Only in this way can their limitations be discovered.

Howdon's New Gasworks

NEW works at Howdon of the Northern Gas Board were officially inaugurated on 22 September by Viscount Allendale. These works, the first gasworks of magnitude to be brought into operation since nationalisation of the gas industry, have been constructed to give a daily output of 12,500,000 cubic feet per day—8,000,000 cubic feet of coal gas and 4,500,000 cubic feet of carburetted water gas. The main contract, comprising coal handling and blending plant, coke handling, screening, and storage plant, carbonising plant with waste heat boilers, mechanical producer plant, and primary condensers, was carried out by Gas Chambers and Coke Ovens, Ltd. The carburetted water gas plant is by Humphreys and Glasgow, Ltd.

Throughout, the plant incorporates modern scientific technique in coal carbonisation and gasification, with every refinement of instrumentation, and it includes full provision for the recovery of benzole and for the manufacture of sulphate of ammonia.



A night scene of the dewaxing unit of the Dunkirk refinery of the Societe Generale des Huiles de Petrole, the French associated company of the Anglo-Iranian which was officially opened on 9 October, 1952

IN THE EDITOR'S POST

Specialists' Advisory Panel

SIR,—The Panels of Consultants suggested in the very timely article published in your issue of 4 October may well meet a longfelt want and you are to be congratulated in giving a lead in a matter which has been sadly neglected by the technical press.

Both in England and in America there are associations of consulting engineers and chemists and even industrial and management specialists, who publish lists of members and if asked to do so, make recommendations for individual services. These arrangements work reasonably well in the case of consultants in civil, electrical, mechanical and management engineering, but do not really fill the bill under modern conditions for industries like the ceramic, chemical, food, fuel, gas, oil, metallurgical and plastics industries, to mention some of those which existing organisations can hardly be expected to cover.

It has also for a long time been the practice for consultants to advise one another informally as required, but there has always been the difficulty of knowing how far this is permissible without payment of a fee, and similarly, there has been reluctance to do this without first consulting one's clients.

A panel of say a dozen specialists whose names can, on request, be submitted to clients who normally employ only one personal consultant leads to the necessary authority for mutual consultation without relieving the personal consultant of his responsibilities, and such arrangements may be particularly welcome to financial and investment undertakings, who find themselves unable to employ a number of consultants even if they knew whom to select.

Such panels can with advantage become international in character, those living abroad becoming Associate Members with suitable limitations and Associate Members could also include those qualified to deal only with very specialised problems, and their names as distinct from their activity need not be given to clients until such time as their services are actually needed.

I am myself a prospective member of an informal panel of this kind and others probably are in being or in formation. They will become known without any need to advertise which has always been anathema to consultants, whose code of ethics has been laid down by the principal institutions and thus hardly needs membership of an association to be faithfully implemented.—Yours faithfully,

A PRACTISING CONSULTANT.

London.

Editor's note:—We regret that in this article reference was made to 'The Times Industrial Supplement.' This should, of course, have been 'The Times Review of Industry' (Incorporating the Times Trade and Engineering), published monthly (price 1s.), *by the Times Publishing Company, Ltd., Printing House Square, London, E.C.*4.

Processed Peas

SIR,—The comments on page 383 of THE CHEMICAL AGE, 20 September, really show a lack of understanding of the English Canning Industry. To take the points at issue:

The British public are fully aware of the designation 'processed peas.' The description was originated by the Ministry of Food, Labelling Division, and the word 'processed' appears on every label and advertisement where it is applicable. For a century the British public have been great consumers of dried peas. The fact that industry has now enabled them to have those peas served more palatably and without the trouble of cooking, is surely another example of British enterprise. The acceptability is proved by the fact that out of some 700,000,000 cans of fruits and vegetables packed in 1951, no less than 300,000,000 were processed peas, and surely we should not under-rate the intelligence of the British public to the extent suggested.

To suggest any comparison between this country and the U.S.A. for the availability of fresh garden peas, reveals a lack of knowledge of the agricultural side. The pack of English garden peas in cans, even in spite of rapid development over the past 25 years, is still only 70,000,000 cans. The period of six to eight weeks when fresh peas are available for canning, is much shorter than that in the U.S.A. and enormous plants could not be maintained for such a short time unless winter canning was available. Nearly all British canners regard the canning of processed peas as an invaluable aid to the stability of their annual production. In effect,

the processed pea is merely a modern and advanced method of providing the consumer with a vegetable which has been in annual use to the extent of 90 to 100,000 tons of peas, either in the form of dried peas in bulk or in cartons. The housewife is able to use this food at a time when other forms of peas would not be available.

I take exception to your statement that 'you can understand my disappointment that the public should be made aware of what processed peas are.' It is an unworthy implication, and one which is completely unjustified by the comments I made. The Processed Pea Canning Industry has grown to large proportions since it was started about 1928, and we have made every effort to ensure that the designation is known and understood. This industry has helped to raise the growing of harvested peas in this country from 38,000 acres in 1939, to what was a record in 1949 of 187,000 acres. Surely such an industry needs support not condemnation. This trade is all over and above the acreage which is grown for fresh garden peas.—Yours. etc.,

Sheffield. M. W. BATCHELOR.

British Abstracts

SIR,— Your correspondent, 'Don Pip,' seems to beg the question on the retention of *British Abstracts*. I would point out a few points of their actual superiority over the *American Chemical Abstracts* which he seems to like so much.

1. Being a British production, the abstracting of home patents and minor and trade journals is very comprehensive.

2. Borderline subjects, e.g., mould and press designs, are briefly mentioned in the respective sections, whereas American mention of such subjects is almost non-existent.

3. Specialist indexing is facilitated by the 'one side only' printing.

4. The abstractors maintain a very high standard of English coupled with adequate coverage of individual papers using intelligible, i.e., British, terminology.

The contribution of Britain to chemistry in the past has been a brilliant one, and the future can be equally bright providing we maintain our individuality. Let us hope that the cornerstone of our profession is not swept away by its own members.—Your, etc.

London. R. CASTLE.

Addition to KID Duty

LISTED below are 59 chemicals added to those liable to Key Industry Duty:—

Acetoacet-*o*-anisidide; acetoacet-*p*-toluidide; acetoacet-2: 4-xylidide; 3-(β-acetyl-*a*-phenylethyl)-4-hydroxycoumarin; 5-allyl-5-(1-methylbutyl) thiobarbituric acid; 5-allyl-5-(1-methylbutyl) thiobarbituric acid, sodium derivative; *p*-aminobenz-2-diethylaminoethylamide; *p*-aminobenz-2-diethylaminoethylamide; sulphate; 2-aminopyrimidine; amphetamine citrate; amphetamine phosphate; antimony lithium thiomalate; benzhexol hydrochloride; *mono*benzhydrazide; bilirubin; biliverdin; N-Cetylpyridinium chloride; chloroamphenicol; 4-chloro-2-methylphenoxyacetate acid; decamethonium bromide; decamethonium iodide; deoxycorticosterone acetate; 2: 4-dichlorophenoxyacetic acid; 1: 1′-dicyanoazocyclohexane; diethanolamine; 2: 2-di-(*p*-hydroxyphenyl) propane; dimidium bromide; *n*-dodecane-1-thiol; N-*n*-dodecylpyridinium chloride; *mono*ethylideneacetone; formdimethylamide; gallamine triethiodide; hexamethonium hydrogen tartrate; 4-hydroxypentan-2-one; isoniazid; khellin; lignocaine; lignocaine hydrochloride; maleic hydrazide; N-*mono*methylamphetamine; N-*mono*methylamphetamine salts; S methylthiuronium iodide; S-methylthiuronium sulphate; β-methylumbelliferone; murexide; β-*mono*nitrostyrene; 2-nonenoic acid; noradrenaline hydrogen tartrate; pentaerythritol; potassium *mono*phenylacetate; 6-*n*-propyl-2-thiouracil; salicylallylamide; semicarbazide; sodium 2: 4-dichlorophenoxyacetate; sodium 2: 3-dimethyl-1-phenyl pyrazol-5-on-4-yl - N - methylaminomethane-*mono*sulphonate; tetramethonium bromide; tetramethonium iodide; vitamin B_{12} crystalline.

The Order, the Safeguarding of Industries (List of Dutiable Goods) (Amendment No. 3) Order, 1952, which came into operation on 7 October, 1952, is published as S.I. 1952, No. 1732.

Chemicals already liable to Key Industry Duty are given in the Safeguarding of Industries (Lists of Dutiable Goods) (Consolidation and Amendment) Order, 1949 (S.I. 1949, No. 2308), the Safeguarding of Industries (List of Dutiable Goods) (Amendment) Order, 1950 (S.I. 1950, No. 1099) and the Safeguarding of Industries (List of Dutiable Goods) (Amendment No. 2) Order, 1950 (S.I. 1950, No. 2085).

Development Progress at Beckton

Water Gas Unit & Boiler House Opened

A FURTHER stage in the development programme of the North Thames Gas Board was completed on 2 October by the official opening at Beckton, the largest gas works in Europe, of a new carburetted water gas plant, new boiler house and new mechanical workshops and engineering stores for the Products Works section.

In the water gas process coke is a primary raw material, gas being made by passing steam under pressure through red hot coke. The gas is then enriched by admixture with other richer gas made by spraying oil on incandescent chequer bricks.

Housed in a ferro-concrete building supported on 40-ft. piles, the new carburetted water gas plant was built by Humphreys & Glasgow, Ltd. It consists of four single automatically operated water gas generators fitted for back-run operation and having a combined capacity of 18,000,000 cu. ft. a day of carburetted water gas at 500 B.Th.U./cu. ft.

The generators have an internal diameter of 9 ft. and are provided with dry sealed Haug grates which permit blast pressures of up to 60 in. water gauge to be employed. The grates extract the ash and clinker and deliver it into enclosed clinker pockets having sufficient capacity for eight hours working, between discharging operations.

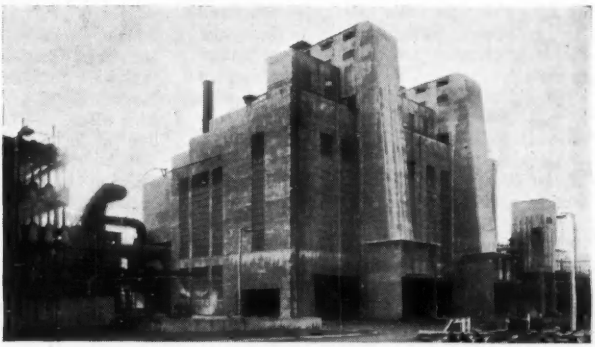
Following each generator there are chequer filled carburettor and superheater vessels, followed by a horizontal type of fire tube waste heat boiler. The waste heat boilers raise steam at 300 lb./sq. in. superheated to 500-650°F., while the annular boilers of the generators raise saturated steam at about 30 lb. per sq. in.

Provision is made for dust extraction at the outlet of the generators and at the outlet of the waste heat boilers, prior to the stack valves, the latter being enclosed and situated outside the main building.

The high pressure steam from the waste heat boilers is supplied to a 'pass out' type of turbo generator of 1,400 kW. capacity, which provides all the electric power to drive the air blowers, exhausters, pumps and mechanical handling equipment, with a surplus available for the works system.

Steam passed out from the turbine at 15 lb./sq. in. flows through two steam accumulators to smooth out the varying rates of steam production and demand, and thence to the process mains supplying the water gas generators at 7 lb./sq. in., where it is augmented by low pressure steam from the generator boilers and the surplus from the coke oven producer plant. The steam system is balanced by the quantity passing to the condenser of the 'pass out' turbo generator, this being automatically adjusted to the overall steam load conditions.

Coke supplies to the plant are conveyed by road transport and elevated to the service bunkers by twin skip hoists. The feeds from the bunkers to the automatic chargers on the generators pass over magnetic vibrating screens for removing small particles below one in. coke.



An exterior view of the new carburetted water gas plant at Beckton

The new plant will add one-seventh to the gas-making capacity of the Beckton works.

Another carburetted water gas plant is at present under construction with a capacity of 18,000,000 cu. ft. a day. It is scheduled for completion by 1954.

Due to the additional gas making plant installed at Beckton in recent years, the demand for steam has increased and is likely to grow still greater.

In addition, one boiler plant consisting of 12 water tube boilers is obsolete and at the end of its useful life.

New Boiler Plant

A new boiler plant has, therefore, been built to replace the old boilers and augment the general steam production of the works. The new installation comprises four Babcock & Wilcox C.T.M. type water tube boilers, each capable of an output of 40,000 lb. of steam an hour at a superheater outlet pressure of 500 lb./sq. in. and a final temperature of 750°F. The boilers are operating at present at a working pressure of 300 lb./sq. in., and the high pressure will be used at a later date.

Steel cased and brick lined, with furnaces having suspended front walls and arches, the boilers are all of the refractory Liptak type. Economisers of the gilled tube type are provided. The heating surface of the water tubes is 4,960 sq. ft. and the superheater 2,860 sq. ft. The heating surface of the economiser is 5,180 sq. ft.

There are 28 stokers of the compartment type, with travelling grates. Each stoker has a grate area of 252 sq. ft. The boilers have been specially designed to burn coke breeze, and ignition is assisted by recirculating furnace gases through the incoming fuel bed by means of fans. The ash is quenched and removed by paddle ash extractors and delivered on to a conveyor belt and thence to an ash hopper. Grit re-firing equipment is provided, and the boilers are fitted with hydraulically operated automatic soot blowers.

An interesting feature is the concrete lining of the fuel hoppers and fuel pipes as protection against corrosion and erosion.

A steel framed building with brick cladding, designed by the Board, houses the four boilers. The coke breeze fuel is brought to the boiler house by road vehicles and elevated to the bunkers by two counterweighted skip hoists, each with a capacity of 30 tons an hour. The capacity of the bunkers is adequate for 48 hours' steaming. The boilers are provided with all the necessary instruments for efficient operation, and the thermal efficiency of the plant is about 75 per cent.

Costing approximately £500,000, the new boiler house is expected to pay for itself in 3½ years.

The Products Works of the North Thames Gas Board receives the crude tar, ammonia liquor, crude benzole and spent oxide produced in the manufacture of purified towns gas from the carbonisation of coal. Most of the stations in the area of the North Thames Gas Board pump or barge these by-products of gas making to the Products Works at Beckton, where they become raw materials for processes in which marketable products are made.

These products meet wide demands in a large number of industries. Some of the uses and users are:—

Pitch for patent fuels and carbon electrodes; road tar; creosote for timber preservation and the preparation of liquid fuels; naphthalene and phenols. The fine chemical industry uses as raw materials the purified naphthalene. The plastics industry received large quantities of phenolic and cresylic products for making synthetic resins. Benzole and its allied solvents, after refining at this works, are used as raw materials for pure chemicals and as fuels in internal combustion engines. Sulphuric acid is made from the sulphur contained in spent oxide and used to combine with ammonia from gas liquor in the production of fertilisers. In addition a variety of less known, but important, chemicals is produced.

The Products Works

The Products Works is a self-contained unit with process plants engaged in the activities outlined above, and provided with steam, electricity and other services from its own plants. It has developed as the demand for gas has increased over the last 70 years, and by 1939 had reached a point where the existing plants and services were almost saturated. Wartime damage and delayed maintenance contributed to the Board's decision in 1945 to re-build large portions of the works, and increase their capacity, so that they might deal with increasing output of crude by-products efficiently.

Stages in the planned development of the

works have been reached, including the completion of acid making plant, an advanced point in additonal tar distillation plant, the replacement of a war damaged works laboratory, the building of a welfare block, providing canteen accommodation, changing and washing facilities, in accordance with the Chemical Works Regulations, and now mechanical workshops.

To maintain the production plants and services a force of craftsmen in all the mechanical and building trades is employed, and it is their activities which will be housed in the new workshops.

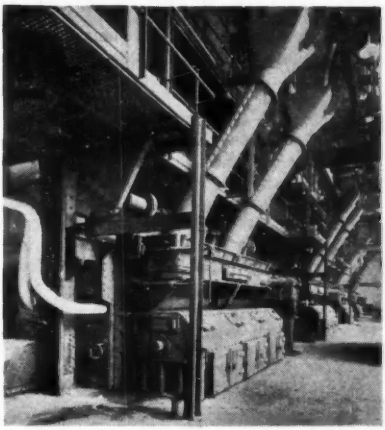
These workshops take the place of the old, obsolete and scattered units which have been inadequate for the growing needs of the works, and on a floor space of about 80,000 sq. ft. most of the 400 men engaged in maintaining the chemical process plants will be accommodated, together with engineering stores.

Carried on reinforced concrete piles, the building is in four main bays, three of which are fitted with overhead travelling cranes. The north light roofs are carried upon steel stanchions which rise from the floor and also support the beams for the overhead crane carriages. At the eastern end, a second floor has been constructed to accommodate the drawing office and the mechanical engineering staff.

A notable feature of the design is a generous assembly area readily accessible to all the crafts for building and repairing large units of plant. Materials received by road and rail will pass smoothly through a checking station into the workshops stores. The installation of all the machine tools and fittings is not yet complete, owing to delay in delivery, but equipment will be built up gradually during the next two years.

Official Opening

The official opening of the new plant was performed by Colonel H. C. Smith, chairman of the Gas Council, in the presence of about 50 members of the gas industry and area boards throughout the country. Introducing Colonel Smith, Mr. Michael Milne-Watson, chairman of the North Thames Gas Board, in whose area Beckton gas works is situated, said that Beckton owed its existence today to the long-sighted planning of Simon Adams Beck and his lieutenants in 1866. From that time when all the land had been marshy grazing ground Beckton had grown to be the largest gas-producing plant in Europe. Not that size was necessarily any claim to face. Beckton should be remembered because it had always been a centre of pioneering and was the manifestation of a brilliant piece of imaginative planning, which took the gas works well away from the city and gave it cheap coal, due to its deep water facilities which enabled colliers to link the retort houses with the coal mines of Durham and Northumberland.



The new boiler plant

It was interesting to recall, said Mr. Milne-Watson, that the original works cost some £600,000 while Colonel Smith would be inaugurating three installations of plant valued at some £2,000,000.

There was an interesting connection between the new C.W.G. plant and the early days at Beckton because Humphreys and Glasgow, who built the plant, designed the first C.W.G. plant to be erected in England, which was erected at Beckton in 1891. There was still on the original site a C.W.G. plant, which was capable of producing over 40,000,000 cu. ft. of gas per day.

Overall efficiency of the new C.W.G. plant was one which had never before been achieved. It would gasify some 300 tons of coke and 36,000 gallons of oil daily to produce 18,000,000 cu. ft. of 500 B.Th.U. gas. or nearly twice as much gas as the whole of the Beckton works produced in 1880. The waste steam of this new plant was used to generate electricity which would not only make the plant self-supporting electrically.

but would allow it to 'export' current to the rest of the works. The plant was, therefore, doing its bit to alleviate the peak-load worries of the BEA.

At full output the boiler house (which was opened by Colonel Smith afterwards) would be fed by 400 tons of breeze a day. It had been built to meet the needs of a still growing works and to replace a number of obsolete boilers which, incidentally, burnt coke. From this centralisation of steam power and the increased use of low grade fuel many advantages and economies were expected.

The works was also very proud of its new mechanical workshops at the Products Works, which were some of the finest of their kind in the country.

Tribute To Contractors

Mr. Milne-Watson ended his introductory speech by paying tribute to the work of the contractors who had been involved in the three projects, many of whom were represented at the opening. He thanked especially Humphrey & Glasgow, Peter Lind, W. H. Allen, Babcock & Wilcox, A. Roberts & Co., Aston Construction, Ltd., Thomas & Edge, and Sir Robert MacAlpine & Sons, for all the work they had done.

Much of the work bore the hall mark of their own engineers, chemical engineers and drawing office staff who must have felt justly proud of the outcome of their work. Mr. Milne-Watson also acknowledged with appreciation the work done in their respective spheres by the consulting engineers—Mackness & Shipley and Brian Colquhoun & Partners—and then called on Colonel Smith to perform the opening ceremony.

Colonel Smith thanked the assembled company for their welcome, and said it gave him great pleasure to be invited to Beckton to perform the opening ceremony. Simon Adams Beck, he said, was a man of great vision, but he wondered if he or any of his colleagues could possibly have visualised the effect which would result in the year 1952 of his driving in the first pile of the river wall nearly 100 years ago.

The name 'Beckton' was known among gas men the world over and none of them could feel that his gas education was really complete without having paid a visit to what Mr. Milne-Watson had so rightly described as the largest gas production plant in Europe, if not in the world.

But size was not the only criterion by which to judge a gas works. For many the visit was one more to add to a list at each of which they had seen something new and progressive. Something demonstrating in a practical form the skill of the engineers, technicians and workmen who had designed and built the various plants.

Reconstruction and improvement never stopped at Beckton, said Colonel Smith. Larger and more efficient plants and apparatus of various types were continually being built or installed to replace those older and less efficient and to meet the growing demands for gas from domestic and industrial consumers. The plant he was opening was the most up-to-date and efficient carburetted water gas plant in Europe or even in the world. Both this and the new boiler house and the mechanical workshops at the Product Works, which he would open later, would be found full of interest and well worth visiting.

The construction of these new works at a time of serious materials shortages occasioned by imperative demands elsewhere reflected the greatest credit on the chairman of the North Thames Gas Board, Mr. Milne-Watson, and his colleagues, on the chief engineer, Dr. Burns and his technical staff and on the contractors concerned.

It had been their good fortune in the past that the gas industry had attracted men of skill and vision. With the counter attractions of younger and more glamorous industries it would not be so easy to do this in the future, but it was essential for the complete success of the industry that it continued to recruit to its ranks men of this type. Plants such as these they were seeing all helped to demonstrate that the gas industry was very much alive and up-to-date, and a worthwhile industry to serve. Colonel Smith congratulated all those who had been responsible in any way for the erection of the plants, and wished the best of good fortune to all those who worked in them.

Obituary

The death occurred on Thursday, 2 October, of MR. FREDERICK WILSON, chairman and managing director of Frederick Wilson & Co., Ltd., dyers and finishers, Cookridge Mills, Horsforth, near Leeds, at his home, Dunmore, Layton Drive, Rawdon. He was 76 years old.

Australian Newsletter

FROM OUR OWN CORRESPONDENT

THE first ordinary meeting of the Australasian Institute of Mining and Metallurgy met at Mount Isa in Queensland on 17 August, 1952. More than 250 delegates from all parts of Australia attended the meeting. Thirty-three papers were presented on various aspects of mining and metallurgy and discussed in technical meetings. Visits were also arranged to the mines and plants at Mount Isa, Mount Morgan, Blair Athol, Callide, Kingston gold mine, the beach minerals concentrating plants at Southport and Stradbroke Island. The meeting terminated in Brisbane on 29 August, 1952.

* * *

Mount Isa Mines, Ltd., a leading producer of lead, is planning a large copper programme for early next year. The location of a huge copper ore body carrying 4 per cent copper led to exploration and limited exploitation during the years 1943-1945, when 23,171 tons of blister copper were produced. The programme was suspended, however, pending construction of a new smelter. The present ore reserves of copper are estimated at 2,950,000 tons containing 4.1 per cent copper.

The construction of modern concentrating and smelting plants began in 1947 and is nearly complete now. The proposed copper section of the mill embraces primary grinding in a 10 ft. by 7 ft. Marcy mill, followed by secondary grinding in two 8 ft. by 5 ft. Hardinge mills. The mills will operate in closed circuit with duplex Akins classifiers. Secondary classifier overflow will be thickened in an 80 ft. Dorr thickener prior to flotation in level type Fagergren cells. Two stages of cleaning and a regrind are proposed. Copper concentrates will be filtered on American disc filters at the smelter and stored in a roofed patio. The concentrates will be mixed with crushed fluxes and fed to the smelter. The feed will be roasted in two C. & W. eight-hearth roasters and the calcines will be smelted in a reverberatory furnace approximately 90 ft. long by 17 ft. wide, and fired by pulverised coal. Gases from the reverberatory furnace will traverse a waste heat boiler and dust collectors before being let into the atmosphere through a concrete stack, which is 329 ft. high and 8½ ft. inside diameter at the top.

The matte from the furnace will be charged to one pair of 20 ft. long, 10 ft. diameter Pierce-Smith converters from which blister copper will be tapped and cast into ingots. Refining facilities are to be provided for the production of fire-refined copper. The slag will be granulated and used as stope fill.

The new copper smelter will cost £A1,260,000 and is expected to produce initially 50 tons of metal per day. It will reach gradually the target of 50,000 tons of copper per year. Mount Isa Mines would thus emerge as the biggest producer of copper in Australia and in addition to meeting local demands may well meet the world shortage of copper.

* * *

Owing to the acute shortage of elemental sulphur, Australia is using considerable quantities of pyrites for the manufacture of sulphuric acid, which goes mainly into the production of superphosphates. Mount Morgan Ltd., Queensland, are now producing about 40,000 tons of pyrites per annum by floating the iron sulphide mineral from Gold-Copper tailings. According to the chairman of directors of Mt. Morgan, Mr. Malcom Newman, the company is shortly to launch a large-scale production of pyrites, which may more than double the present production. The sulphuric acid industry in Australia has been greatly aided by promise of financial assistance from the Government for converting sulphur-burning plants into pyrites-burning plants. Further, and what is more important, the Government have agreed to protect the sulphuric acid producers from 'dumping' in the event of cheap supplies of sulphur becoming available in the near future. These steps are expected to result in Mt. Morgan stepping up pyrites production to about 200,000 tons per year and conduce to stabilisation of the sulphuric acid industry in Australia by relying on and exploiting indigenous raw materials.

* * *

A new blast furnace, the third in Port Kembla, was blown in on 27 August, 1952, at the Australian Iron & Steel Company, Ltd. The first cast iron was made on the following day. The furnace is designed on

the most up-to-date lines and is designed to produce 1,800 tons of foundry iron per day. The furnace used Whyalla iron ore and coke produced at Port Kembla. The following details as from 30 August, may be of interest:—

Wind Volume C.F.M. (Initial C.F.M. 20,000)	44,055
Coke Consumption (lb./ton)	3,773
Blast Temp. (°F)	1,229
Blast Pressure (lb./sq. in.)	11
Ore consumption (tons/ton)	2.13
Ore analysis—Insol.	2.47
Mn.	0.85
Fe.	65.02
Dust Loss (lb./ton)	11
Metallic yield	47.01
Limestone (lb./ton)	967
Slag volume (lb./ton)	1,344
Average Iron analysis (percentages)	
Silica	2.54
Sulphur	0.12
Phosphorus	0.13
Manganese	0.64
Average Slag analysis (percentages)	
SiO_2	32.60
Al_2O_3	24.30
CaO	39.30
Ratio	1.22

The furnace is undergoing thorough testing of equipment before reaching target production. The new blast furnace will contribute greatly to Australian production of iron.

* * *

The Minister of Supply of the Commonwealth of Australia announced from Canberra recently that a general agreement had been entered into with the Zinc Corporation, Ltd., for the rapid development of Rum Jungle uranium deposits. Technicians of the firm have already left for the field and are to commence work immediately. The firm will be responsible for mining and refining of the ore, and for the provision of workers' accommodation. It was also announced that Australia will soon get from the United States Atomic Energy Commission a uranium refining plant to be erected at the Rum Jungle field for treating uranium ore. The plant is expected to be in operation early in 1954 and will produce uranium oxide which will be sent to Britain and the United States. The Government contemplate the establishment of a Uranium Commission to deal with all aspects of uranium work.

Mount Coolum, in Queensland, is also believed to be a large uranium field according to a private enterprise miner. He recently claimed the discovery of radioactive minerals there. The Minister for Mines of the Queensland Government said in Brisbane that a thorough check was being made on the samples supplied and the area at Mt. Coolum.

New Heating Method

Electrothermal Rubber Sheeting

A NEW method of applying heat in defined areas of any size has been developed and produced and is now being marketed by Electrothermal Engineering Ltd., under the name E.R.S. (Electrothermal Rubber Sheeting).

E.R.S. opens up a vast new field in the application of localised heat to any area. Its robustness, even surface heating, high degree of flexibility, and its superb insulation factor against spillage, tough working and handling conditions make it unique for unlimited applications, say the makers.

On examination, it appears to be a flat sheet of black rubber, but it is electrically wired at 150, 250 or 400 watts per sq. ft. for mains operation, to radiate heat at controlled temperatures up to 200°C. sufficient for all applications of heat to flat, shaped or curved surfaces where the required heat input does not exceed 400 watts per sq. ft. E.R.S. ratings provide for a temperature of 100°C. (Type 1), 150°C. (Type 2) and 200°C. (Type 3) respectively. For general applications Types 1 and 2 have become the standard choice, but Type 3 should be selected if a rapid temperature rise is necessary.

Thermostats and pyrometers are available for use with E.R.S. It will withstand considerable pressure, and data concerning pressures up to 1 ton per sq. in. is available on request.

This product is supplied to requirements in virtually limitless lengths, in width from the narrowest strip up to 6 ft. and a thickness of 3/16 in. Standard sizes range from 12 ft. by 6 in. to 90 in. by 48 in. (heated area), but special sheets can be produced to accommodate customers' temperature and production requirements.

A great success has been achieved, report the company, in the furniture and other constructional industries for quick setting of synthetic resin glues. Other applications for E.R.S. are the heating of chemical apparatus, tanks, vessels, trays, pipes, etc., especially where spillage or fire is likely to occur or where rough handling is required, or where processes have to be carried out involving mobility or flexibility of the heating sources.

Inquiries should be addressed to Electrothermal Engineering, Ltd., 20 Neville Road, London, E.7.

International Analytical Symposium

The Midlands Society for Analytical Chemistry Holds Meeting

THE Midlands Society for Analytical Chemistry held an international symposium on analytical chemistry in the Chemistry Department of the University of Birmingham on 11 and 12 September. The programme was divided into two parts, one dealing with fundamental theories of an analytical chemistry and the other with original methods. Following are summaries of the fundamental papers read and discussed:

Some Factors Influencing the Solubility of Amine Sulphates

by M. Kapel

The classical benzidine method for the determination of sulphate is open to criticism. All techniques involving the precipitation of sulphate ions in the form of the benzidine salt are subject to error, since benzidine sulphate is soluble in water to the extent of 0.098 g./l. Although this solubility can be reduced by the presence of an excess of the reagent, it seems unlikely that the benzidine method will ever attain a high degree of precision. It is clearly desirable, therefore, to precipitate sulphate ions in the form of a salt which is less soluble than benzidine sulphate, but which can still be titrated alkalimetrically.

These considerations gave rise to an examination of the interdependence of the molecular structures of amines related to benzidine and the solubilities of their sulphates. Nuclear substitution by alkyl groups served only to increase the sulphate solubility, so that the weighing effect generally observed in organic chemistry must be counteracted by some other effect. This effect could be electronic or stereochemical in nature; that is to say, it could arise from an alteration of the basic properties of the amino groups, or from a modification of the crystal lattice energy of the sulphate. By varying the positions of the substituent groups and noting the absence of phenomena attributable to hyperconjugation, the conclusion was reached that the effect was a stereochemical one. The factor principally responsible for low sulphate solubility was shown to be the energy required to force the two aromatic rings into a coplanar configuration; this must be reduced to a minimum. A secondary factor was the relative positions of the two amino groups and the bond, or group, joining the two rings; these must be colinear.

As a result of these findings, it became possible to design a molecule which should exhibit low solubility. The molecule was 4,4′-diaminotolane, which has the lowest sulphate solubility (0.059 g./l.) yet found among amines related to benzidine. Some improvements were made in the method of preparation of this substance, and its analytical possibilities are now being investigated.

Methods for the syntheses of amine of possibly even lower sulphate solubility are also being examined.

X-Ray and Electron-Microscope Examination of Potassium Cobaltinitrite Precipitates;

by J. W. Robinson.

It is well established that potassium sodium cobaltinitrite precipitates are of indefinite composition, although the formula $K_2NaCo(NO_2)_6.H_2O$ is generally attributed to them. Many attempts have been made to attain conditions which would yield precipitates of constant composition, and several investigators have assigned different formulae to the precipitates so obtained.

The object of the present work was to prepare cobaltinitrite precipitates under different recommended procedures and to carry out an X-ray and electron microscopic examination of the crystals obtained. In this way, it was hoped to gain some understanding of the true nature of the precipitates and if possible to select or develop a method which could be used for the direct and accurate determination of potassium.

Results showed that the precipitate was a mixed crystal of variable composition depending on the ratio of sodium to potassium in the precipitation mixture. In order that a precipitate of known composition may be formed, the potassium content must be known within narrow limits. It was not possible, therefore, to develop a method for the accurate determination of potassium without the use of empirical correction factors.

The general conclusions may be summarised:—

(1) The composition of the precipitate depends on the ratio of sodium to potassium in solution.

(2) In the unit cell of potassium sodium cobaltinitrite there are 12 sites for alkali metals—8 with type I environment and 4 with type II environment. Sodium successively and randomly replaces potassium from type II environment.

(3) The fractional number of alkali metals present in the empirical formula of the molecule is not due to a mixture of two or more compounds of fixed composition.

(4) There is a slight variation in the composition of crystals from the same precipitate.

(5) There is slight coprecipitation of trisodium cobaltinitrite.

If great accuracy is essential it is recommended that the cobaltinitrite method be used as a means of separating potassium, before converting it to some other weighing form such as the perchlorate.

Solid Phase Nucleation and Analytical Chemistry; by **R. A. Johnson.**

Precipitation is a common unit process in analytical chemistry and thus certain features of the process deserve careful study. Solubility is one such feature, because most precipitations are for the purpose of quantitative separation. For the study of solubility, the solubility product is a fundamental index of great utility.

In addition to solubility the filtration characteristics and purity of the precipitate are important, and are determined in the nucleation process. Obviously, the particle size is related to the number of primary particles in a given precipitate, hence to the number of nuclei formed. It is important, therefore, to seek some index, analogous to the solubility product perhaps, to the nucleation potentials of chemical substances.

The process of particle formation begins with the formation of ion pairs which in turn add other ions, forming groups. These groups, still a part of the mother phase, are called clusters, which, when they reach a certain critical size, appear as nuclei. A nucleus is neither a crystal nor a cluster, and its free energy is a maximum for groups of its species. From the overall view the nucleus appears at the top of an energy hill which slopes off on the side through successively smaller clusters and on the other side through successively larger crystals. The equation for the equilibrium constant for the overall reaction for nucleus formation shows that no appreciable number of nuclei will exist over a rather wide range of concentrations of precipitable material. At a certain point, however, an increase of concentration changes the picture quite suddenly and nuclei appear in significant numbers. It is this effect that accounts for the striking behaviour of supersaturation in bringing about precipitation.

Supersaturation Ratio

In his classical experiments, von Weimarn prepared mixtures in which the solubility product of barium sulphate was exceeded several times and found that long periods of time elapsed before precipitation occurred. At a certain concentration level, a precipitate did appear quickly, and above this level small increases in concentration greatly hastened the precipitation process. Von Weimarn found that in precipitation processes the relationship of supersaturation to rate of nucleation varied from compound to compound and that the nature of the precipitate depended on a 'relative supersaturation ratio.' This ratio is a useful general index relating conditions of nucleation to the final precipitate and is somewhat analogous to the solubility product. It is, however, semi-quantitative.

It is desirable to make the nucleation index specific and quantitative and to define a 'critical supersaturation ratio' in a way that will permit assignment of a value to a particular compound which will index its tendency toward nucleation. Plotting of induction time against supersaturation gives a curve which approaches its limits asymptotically. Some workers have located a 'critical supersaturation' by extrapolating the curve to zero time. When expressed as the ratio $(K_{ss}/K_{sp})^{\frac{1}{2}}$, where K_{ss} is the activity solubility product at critical supersaturation and K_{sp} is the normal activity solubility product, the values for barium sulphate and strontium sulphate are 21.5 and 2.95 respectively. The present author is inclined at the moment to work with the lower limit of the curve, where errors which affect the measurement of time are at a minimum.

For the detection of incipience of nucleation, direct and indirect approaches are available, both of reasonable accuracy. The problem of effects due to growth in addition to nucleation effects is ever present.

Chemical effects must also be considered. Thus, the amount of ion added and the amount available as a reacting species may be quite different. The effects of ionic ratio and organic additives are especially interesting to analytical chemists. Thus, the critical saturation of silver chloride is a function of the concentration ratio of silver and chloride ions. Similarly with barium sulphate.

Picric acid traces drastically increase the supersaturation necessary for nucleation of barium sulphate.

Nucleation studies should provide the analytical chemist with fundamental insights into important precipitation processes, and should aid in the practical development of new methods and improvement of old ones.

Titrimetry and Direct Concentration Measurement by Means of High Frequency Oscillators; by P. W. West.

High frequency oscillators and their applications in analytical chemistry have become a very important subject for research during the past few years. The present paper discussed the ultimate importance of this field and outlines both the trends of developments of oscillometry and the problems existing.

The use of high frequency oscillators in chemistry is not at all new. The present interest in high frequency methods as applied to analytical chemistry stems, however, from studies made since 1945, in which it was pointed out that high frequency oscillators could be used without the necessity of electrodes coming into direct contact with the system to be studied. Blake (1945-50) pointed out the significance of high frequency oscillators in analytical chemistry, and Jensen and Parrack (1946) described high frequency oscillators designed particularly for analytical applications. Since these initial studies, much work has been done in the development of instruments for use in high frequency methods of analysis.

In each case the high frequency oscillator is used as a means of measuring the net composition of some system being studied. The material under examination is placed in a cell, which is a component of the tank circuit of the oscillator, and any change in the composition of the material studied consequently produces changes in the voltages, the grid- or plate-currents, and in the frequency of oscillation.

The instruments employed fall into two general categories:—

(1) Instruments which measure the response derived from chemical systems in terms of current or voltage changes.

(2) Instruments which employ frequency-measuring apparatus.

In the latter case, the instrument generally consists of two oscillator circuits which beat together, and the difference in frequency of the two oscillators is then measured. By inserting a chemical system into the tank circuit cell of the working oscillator, a difference in frequency is produced as compared to the reference oscillator. This difference is plotted against the change in composition so as to produce a working curve for the system being studied.

The well-known heterodyne principle is readily adapted to measurement of frequency changes induced by diverse chemical systems. Instruments of this type are well suited for non-electrolyte systems, but are of limited value in studies of electrolyte solutions.

The development of the field of high frequency methods follows two general lines. The most promising approach is perhaps that of direct concentration measurement. The second major approach is in the study of concentration changes in simple mixtures. In addition there are general applications that pertain to theoretical studies and special problems.

An interesting application of high frequency methods has been discussed by Nance and his co-workers (1952) in which a heterodyne oscillator, using a condenser element, has been applied to the detection of chromatographic zones. Oscillometry holds much promise for use in kinetic studies.

A number of studies have been made on complexation reactions. Thus, Hara (1951) has done a significant amount of work on the study of various complexes formed in aqueous solution using oscillometric techniques.

Summarising this necessarily brief survey, it should be pointed out that most of the work to date has been in the development of new instruments for use in high frequency studies. A wide variety of instruments has been described in the literature, and reference to published circuits will enable anyone to find an instrument suitable for most analytical applications.

The present status of the theory of high frequency methods of analysis is somewhat uncertain. Much work remains to be done before all phases of the theory are worked out, but two excellent articles have recently appeared, one by Blaedel and his co-workers (1952) and the other by Hall (1952), which serve to summarise our present knowledge of the principles applying to this field.

Qualitative Analysis with a Polarographic Oscilloscope; by J. Heyrovsky.

Whilst the majority of workers engaged in oscillographic polarography try to achieve a high degree of accuracy for quantitative determinations, the present author adapts the cathode ray oscilloscope so as to be useful for a quick qualitative analysis. Actually, such an analysis is quantitative to a certain extent.

The experimental arrangement is adapted so as to show on the oscilloscope the potential-time curves. An alternating current passes from a source of large voltage (120-220 v.) across a large variable resistance (ca. 100,000 ohms) through the electrolytic cell with a polarisable dropping or streaming mercury electrode and an unpolarisable layer of mercury at the bottom of the cell filled with an electrolyte. As the polarisation of the cell (or back e.m.f.) and its resistance are both negligibly small against the large voltage and variable resistance, the form of the sine-curve of the alternating current remains independent of the electrolytic processes within the cell. The value of the current varies from 0.5-1 amps for the dropping electrode and from 2-6 amps for the streaming electrode. The polarisable and unpolarisable mercury electrodes are connected to the horizontal plates of the oscilloscope, the time-lags showing the changes in polarisation.

In the presence of depolarisers in ca. 0.001N solutions, time-lags appear on the cathodic and anodic branch of the potential-time curve at the potential of the reduction or oxidation of the depolariser. In the case of a reversible depolarisation the time-lags at the cathodic and the anodic branch are at the same potential. The length of the time-lag is proportional to the concentration of the depolariser. When mixtures of depolarisers are examined, the corresponding number of time-lags appears on the potential time curve.

The potentials of cations which give distinct time-lags have been computed. Numerous organic depolarisers such as aldehyde, unsaturated compounds, nitro compounds and quinones may be similarly computed.

However, the depolarisers may be shown more distinctly, and even quantitatively determined, by plotting on the oscillographic screen the derivative dv/dt against the time, t, or potential, v, on the abscissa.

A still more simple and stabler figure is given by the function dv/(dt-v), as it needs no synchronisation and shows, by the depth of the cut-in, the quantity and, by the position of the peaks on the abscissa, the nature of the depolariser, similarly to the ordinary polarographic current-voltage curve. For inorganic analysis the dropping mercury electrode is suitable, whilst for organic analysis the streaming electrode is preferable.

The method is of advantage where quick qualitative and approximate quantitative analysis of samples is concerned, as, for example, in ore analysis, or, especially, in organic analysis for testing the purity of preparations.

Decomposition of fresh aqueous solutions of penicillin may be followed by this method of oscillographic analysis. In addition, there are several other applications of the method, e.g., rapid qualitative analysis of carbon disulphide, hydrogen sulphide and sulphur dioxide in the atmosphere of industrial works.

The Importance of Polarisation Curves in Electrochemical Determinations; by R. Gauguin.

This paper was highly mathematical and a summary of the development of the theory would be quite inadequate.

The old applications of electrolysis in analytical chemistry were limited to quantitative separations. Broadly, the more recent uses may be divided into two groups:

(1) Those in which the electrode serves merely to indicate a concentration (potentiometry and amperometry);

(2) Coulometry, in which a reaction is carried out to completion and the equivalent quantity of electricity is measured.

In both cases, redox phenomena occur at the electrodes, but polarisation curves are even more important than oxidation potentials. The formulæ of the polarisation curves may be derived, and suitable approximations introduced which are valid under normal working conditions. The effect on the polarisation curves of the gradual

removal of the substance to be determined by titration with a precipitant or oxidant may be explained diagrammatically. On the basis of this effect as well as the nature of the electrical circuit used, the methods of the first group may be classified, and a better understanding gained of the relative suitabilities of potentiometry and amperometry under various circumstances.

The optimum conditions for the determination have been established for methods of the first group. Graphs obtained under actual experimental conditions illustrate this.

Finally, in order to obtain reasonable accuracy in coulometry it is necessary to limit the current used, so that the operation becomes too lengthy to be of practical value. This, however, can be overcome by the use of an auxiliary redox system.

Mechanism of the Dead-Stop End Point; by J. E. B. Randles.

The mechanism of the dead-stop method of detecting the end-point of an oxidation-reduction titration is most easily understood on the basis of the relevant current-voltage curves. When the potential of an inert (e.g. platinum) micro-electrode immersed in the solution is varied during a redox titration, the resulting C-V curve changes as the titration proceeds. Before any of the reductant has been added a cathodic current is obtained at a sufficiently negative potential of the electrode, which declines to zero if the potential of the electrode is made more positive. In 'polarographic' terms, there is a cathodic diffusion current, or a cathodic 'step' on the C-V curve. As the oxidant is titrated with reductant, the purely cathodic step becomes a combined anodic-cathodic step due to the presence of increasing amount of the reduced form of the oxidant. In addition, a second cathodic step due to the oxidised form of the titrant develops.

The two steps are separated by a voltage difference corresponding approximately to the difference of 'redox' potentials of the two 'redox' systems, i.e., the substance being titrated and the titrant. As the titration proceeds the 'plateau' between the two steps approaches the zero current line, as the amount of the original oxidant, which is being titrated, decreases. At the end-point of the titration it crosses the zero current line.

If the behaviour of a pair of micro-electrodes immersed in the solution is considered, the mechanism of the current minimum at the end-point is easily understood. A small potential difference is applied to the electrodes by means of an external circuit, and in one small net cathodic current, and in the other a small net anodic current, flows. Their potentials therefore correspondent to points on either side of the point where the C-V curve for a single electrode cuts the zero current line. The magnitude of the current flowing in them for a given small P.D. (say, 50 mV.), is proportional to the slope of the C-V curve where it crosses the zero current line. This slope decreases to a sharp minimum at the stage of the titration at which the plateau of the C-V curve between the two steps crosses the zero current line, since the plateau, naturally, has small, almost zero, slope.

This qualitative picture leads directly to a quantitative treatment. For the particular case when both redox systems are 'reversible' the change of the current flowing in the micro-electrodes is easily calculated for the whole course of the titration. The current minimum at the end-point depends on the difference between the redox potentials (or more precisely the half-wave potentials of the two systems. Thus

$$i_{min} = \frac{nF}{RT} \cdot \Delta V. \frac{i_{d\pm}}{e^{\frac{nE}{2RT}(V_{\frac{1}{2}} - V'_{\frac{1}{2}})}}$$

where n, F, R and T have their usual significance, $i_{d\pm}$ is the geometric mean of the two diffusion currents in the complete C-V curve at the end point of the titration, and $V_{\frac{1}{2}}$ and $V_{\frac{1}{2}}'$ are the two half-wave potentials. V is the P.D. between the two micro electrodes.

When either or both of the redox systems are not 'reversible' no simple expression for i_{min} can be obtained, but from the calculated, or experimentally measured, C-V curves for the two systems, the change of the current throughout a titration can be plotted and i_{min} obtained from this graph. The 'sharpness' of the minimum, which is equally important, is also evident from this graph.

The reason for the applicability of the dead-stop method of end-point detection to some titrations other than the oxidation-reduction type is also clearly seen from a consideration of the relevant C-V curves. Examples are the titration of chloride by silver in the presence of nitrite ion, and of zinc by ferrocyanide in the presence of air or a little ferricyanide.

New Shell Rust Inhibitor

'V.P.1' Lengthens Aero Engine Life

EXTENSIVE tests carried out over a number of years by major airline companies and aero engine manufacturers have shown that a new chemical, Shell V.P.I. (vapour phase inhibitor) can substantially increase the storage life of aircraft engines by simple and economical protection against rust and corrosion.

The damage caused by rust is enormous. In the U.S.A. alone, the annual loss is estimated at some £2,000,000,000. Even the cost of merely preventing corrosion is a formidable figure, as witness the £100,000,000 odd spent on this task by U.K. industries each year. Aero engines, by virtue of the need for complete reliability and high performance under all conditions, are a particularly vulnerable target and any steps taken to prevent their deterioration while they are in store or being maintained is of obvious strategic and economic significance.

Aircraft Engine Rusting

The problem of rusting in aircraft engines is aggravated by the fact that an engine 'breathes,' i.e., takes in and expels air and moisture from any openings. The conventional methods of protection have involved sealing of the metal surfaces from the air and water and have not, on the whole, been very adequate. In the first place, they have not stopped rusting completely, with the result that costly parts have had to be replaced. Secondly, the work involved in preserving and depreserving the engines has resulted in excessive labour costs.

The unique characteristic of Shell V.P.I. is that it does not react with, or remove either the moisture or oxygen but instead operates successfully in their presence by inhibiting their corrosive action. Consequently, if the chemical, which is slightly volatile, is properly used, its vapour penetrates to every part of the engine and affords complete immunity from rust over a period of several years. Moreover, when used on turbine engines, and on all spare parts there is no lengthy depreserving process.

One test, for example, was carried out on the two jet engines of a Meteor aircraft which was left out in the open for two years and six weeks. One engine was protected from rusting and corrosion for the whole period only by the presence of V.P.I.260, and the other engine had silica gel dehydration for the first year, but this was replaced by the V.P.I. powder for the rest of the time. All steel parts which were unrusted at the beginning of the test were in their original shiny condition when inspected.

As a final and drastic check on the state of the engines, it was decided to run one of them then and there. With only hand priming of the fuel system and without prior testing, the engine started up right away and gave full performance on a normal run up.

Again, in a test carried out by Pan American Airways in the humid atmosphere of Honolulu, two stored engines which had been protected with V.P.I. for six months were run without fault for 1,200 hours. Already, eight major airlines and several engine manufacturers have reported favourably on the use of V.P.I.

V.P.I., the active substance of which is a slightly volatile nitrite salt—dicyclohexylammonium nitrite—is of value wherever the menace of corrosion is present. It is already in use by several industries in the U.K. and on the Continent, notably by the Austin Motor Co., of Longbridge, England, for despatching car components overseas, and can be applied either in powder form or as a coating on paper. Paper manufacturers in five European countries, Holland, Belgium, France, Germany and Denmark are at the moment making V.P.I. paper under licence from Shell.

Bentonite in Hungary

NINE Hungarian scientists and engineers have recently received awards totalling 100,000 forints for their researches into Hungarian bentonite resources, now believed to be second in importance only to that country's extensive bauxite deposits.

Bentonite mining began in Hungary in the 1930's, and Hungarian bentonite was used in foundry work for the first time in 1941. In 1949 a bentonite research committee was set up with the aim of finding out how best to exploit this product during the five-year economic development which began in 1950.

As a result of its work, the use of bentonite has spread to 42 different industries, and a surplus is now available for export.

In addition to a factory for processing bentonite already established at Mád, a new factory will shortly be opened for large-scale processing of this commodity.

Ramsay Centenary Appeal

Exhibition Opened at the Science Museum

TRIBUTES to one of Britain's greatest chemists and scientists were made by speakers at the opening of the exhibition at the Science Museum, South Kensington, London, on 2 October to celebrate the centenary of the birth of Sir William Ramsay.

The occasion was also marked by the launching of an appeal by University College, London, and the Ramsay Memorial Fellowship Trust for £100,000.

When Ramsay came to London the conditions and amenities at University College were inferior to those he had left at Bristol, and few men of his distinction can have had poorer accommodation than the laboratory in which he worked for the next 25 years. It seems therefore fitting that £75,000 of the amount asked for in the appeal should be used to build a fifth storey on the chemical laboratories at University College. Plans already drawn up for the extra storey would, it is estimated, increase by 100 the number of students of chemistry as a basic subject, or would add over 30 per cent to the existing number of advanced chemistry students.

With the fall in the value of money the original endowment of the Ramsay Fellowships now only supports half the number of British Fellows doing advanced chemical research and the remainder of the sum will be devoted to restoring the original number of Fellowships.

Opening Ceremony

At the opening of the exhibition, which was attended by a number of distinguished guests, the Earl of Halsbury, F.R.I.C., chairman of the advisory council of the Science Museum, announced the purpose of the display and invited Lord Woolton, Lord President of the Council, to declare it open.

Ramsay, said Lord Woolton, was not only a great scientist but also a devoted teacher who attracted collaboration and brought out the best in all those who worked with him. He had a unique knowledge of university organisation both at home and abroad and he initiated the idea of the State helping the universities.

Pure research, continued Lord Woolton, had led to vast developments in the industrial life of Britain, but much of the work of British scientists has not been applied in this country, because of failure to train, and to absorb into industrial life, the chemical engineers and applied physicists—those practical scientists now called 'technologists.'

If, in the face of world competition through the application of the vast scientific discoveries of the current age full benefit was to be derived from the work of the fundamental scientists, it would be necessary to create in Britain technological universities with the status and the distinction of existing universities.

Dr. B. Ifor Evans, provost of University College, London, thanking the Lord President of the Council for opening the exhibition said that the State had gone far since the days of Ramsay in its assistance and collaboration with the universities, but at University College they were only too well aware that the resources so provided must be extended if scientists of today were to have an adequate opportunity of emulating the achievements of the past.

Appeal for Funds

It was for this reason that they ventured to associate with the celebration of Sir William Ramsay's Centenary, an appeal for funds to extend the laboratory in which he worked.

In conclusion he expressed the thanks and appreciation on behalf of University College to Lord Halsbury and members of the Science Museum, in particular to the director, Dr. Sherwood Taylor, and Mr. Barclay, keeper of the chemistry department, for the excellent exhibition.

Dr. Sherwood Taylor gave a masterly summary of the life and work of Sir William Ramsay.

The exhibition, which will remain open until 3 January, 1953, is divided into three main sections, beginning with a number of personal relics such as letters, honours conferred on Ramsay by various scientific bodies and general biographical material.

Next comes a series of exhibits illustrating the main work of his life, often done in collaboration, on the discovery of the rare or inert gases. The original apparatus he

used for the isolation, by chemical methods, of argon from air in 1894, is on view.

Many smaller pieces of apparatus which belonged to Ramsay are also displayed, and there are a number of interesting portraits, both paintings and photographs.

The final section shows the application of the inert gases to modern industrial purposes.

Working demonstrations and special colour films illustrate the use of argon in arc welding. Self-operated exhibits show how the inert gases are employed in modern illumination, of which the red neon sign is a familiar example, and a full-scale figure shows how helium may be used in deep-sea diving operations. The production of the inert gases as by-products in the manufacture of oxygen by the air-liquefaction process are also illustrated.

'Advisory Service on Flexibles'

AN advisory and supply service covering flexible tubing and hoses of all kinds has been set up by Compoflex Co., Ltd., at its new showrooms at 26 Grosvenor Gardens, London, S.W.1.

Displayed in the showrooms are hundreds of various 'flexibles' and illustrations of the various applications. By installing this service, it is hoped to make a centre to which manufacturers may go for information and advice on all types of tubing and hoses for steam, air, oil, dust, water or electrical wiring.

Lt.-Col. Rohde, secretary of the Engineering Industries Association gave a short speech of welcome to the visitors at the opening on 30 September.

Insecticide Surplus in the U.S.A.

CONCERN about the present surplus of stocks and its effect on prices and profits was expressed by the National Agricultural Chemicals Association at its annual meeting in New York.

The industry at present has the biggest surplus of its products in its history, despite the fact that many factories have been shut down for two or three months. The marketing season is now nearly over, and this means that the surplus goods will not be able to be sold until buying for next year's crop begins.

Among the steps outlined by Mr. A. Mohr, president of the association, which might ease the situation was a suggestion to ask the Government to increase the export quotas on insecticides. Another proposal was to increase educational work among farmers and banks dealing with farmers so that greater credit might be allowed.

Circumstances which had contributed to the surplus included an easing in competition due to the improved materials situation and greatly increased production, while at the same time drought and light insect infestations had reduced the need for insecticides.

Once these temporary difficulties had been overcome, the long-term prospects for the industry were considered good. The increasing population in the U.S.A. would require more food from virtually the same acreage of arable land. The only way to produce this would be through the increased use of insecticides and farm chemicals to reduce the huge yearly losses caused by insect destruction.

The new showrooms in Grosvenor Gardens, London, for an advisory service on flexibles

The French Petroleum Industry

More Incentive for Prospecting Needed

IN the history of the world the shifting of the main centres of economic and political power from one region or country to another has followed, on a superficial view, a somewhat erratic course. Many factors play a part and the whole process is doubtless complex though probably subject to definite laws—a fundamental problem for the historian. Today it seems that among the leading factors is that of available raw materials and especially fuel and power sources. In an interesting and informative review of the French petroleum industry, Louis Chove has recently suggested the possibility that economic power and status may once again return to the Mediterranean countries, or some of them, on the basis, mainly, of potential petroleum reserves. M. Chove is a director of the Union des Chambres Syndicales de l'Industrie du Petrole, and spoke at a meeting of the Centre de Perfectionnement Technique on 12 May. His address has just been published in *Chimie and Ind.* 1952, **68** (2), 237-242—Aug.

Estimated Reserves

Estimates, of course, vary, but according to some authorities the proved reserves of the U.S.A. will, at present rates of consumption, be exhausted in 11 years. Hopes are now centred more and more on the Middle East and the Mediterranean borders. After summarising the history of the petroleum industry in France the author points out that in 1951 the French refineries dealt with 18,500,000 tons of crude (¼ of this for home needs). Ninety per cent of this tonnage came from the Middle East, 8 per cent from Venezuela, and 1.6 per cent from lands of French origin. On the other hand imports of refined oil were only 278,000 tons, as against 403,000 tons in 1912. France no longer imports automobile oil, petrol, gas oil, fuel oil, asphalt, lubricating oils (of commoner types), but almost solely, aviation oils of high octane index and lubricants of very high viscosity.

Freight charges on these large imports of crude have hitherto been a heavy item of cost, and to buy this year 16,000,000 tons of refinery products would cost f.o.b. some $425,000,000, payable in hard currency. Corresponding imports of crude, however, would cost no more than $263,000,000 payable 30 per cent in dollars, 30 per cent in sterling, and 40 per cent in francs. French tanker transport has apparently become much larger and more efficient, and charges c.i.f. for 1953 should be much less, so that 62 per cent of these will be payable in francs, as compared with 43.5 per cent in 1951. Total French imports in 1951 of all goods amounted to 1,270,000,000,000 of francs, of which crude petroleum accounted for 171,000,000,000 and textiles 211,000,000,000. Petroleum refining has now become one of the major industries of France.

Search for Oil

M. Chove emphatically stresses the importance of research, by which he means chiefly the scientific search for oil. He says that in France and French oversea dominions they have vast sedimentary areas, many of which are well worth exploration; but whereas in Canada and the U.S.A. the taxation systems encourages such search for oil, this is not the case in France. Nevertheless a certain amount of success has attended the search for oil and gas in France itself, as in the discovery of considerable natural gas reserves in the Saint-Marcet district. Exploration work has by no means been neglected by the State. The cost in State funds during the five year plan 1946-1950 was 45,000,000,000 francs, and some 12,000,000 tons of hydrocarbons have been discovered, including the Saint-Marcet gas or its equivalent in solids. The cost per ton therefore has been 3,750 francs, which is about the average cost in the U.S.A.

While consumption of petrol in France from 1938 to 1951 has only increased by 6 per cent, in England it has increased 19 per cent, and in Italy still more. In the author's opinion this is partly due, at least, to the greater use and development of the Diesel engine and to the special incidence of the French fiscal system. He distinguishes between petrol (*essence*) and what he calls 'fuel' and says that it is only possible, from a given crude, to obtain '*essence*' and 'fuel' in definite proportions. The French

refineries prefer those crudes, such as come from Kuweit, that are specially rich in the latter, and in any case that permit a high degree of elasticity in production. Such elasticity is now only attainable by means of new processes or plant such as cracking, or thermal or catalytic reforming, which affect mainly the light or medium molecules and not the heavy molecules that are now so valuable. Therefore the technique of refining becomes more and more exacting and complicated.

Power production in France will probably increase but little during the next few years. Coal output may rise from 55,000,000 tons in 1951 to 60,000,000 tons in 1960, and hydro-electric power amount to 1,000,000,000 kWh; but these together would only represent about 1.5 per cent of total power requirements. Extension of refinery capacity is the most likely means of making up the balance. A new oil policy must be established in France aiming to encourage greater production of petrol (*essence*) through remission of taxes. And petrol must be regarded strictly as a by-product in the manufacture of 'fuel'—under present conditions of French finance and exchanges. The same policy would help solve the urgent problem of greater mechanisation in agriculture, especially in making the petrol tractor more available for small and medium farmers who often cannot afford the higher cost and upkeep of Diesel tractors. The lowering in cost of fuels (*carburants*)—in which gas oil must be taken into account—would also go far to solve the difficult problems of domestic heating. France, says M. Chove, 'is the only country in the world where they contaminate gas oil with heavy fuel in order to produce an inferior domestic combustible, forcing us to provide burners that are 50 per cent dearer than those of other countries.'

Liquid Fuel Meets Requirements

If since 1938 world power consumption has risen 50 per cent it has been met largely from liquid fuel (*petrole*). Barring international complications there is no reason why this should not continue to be the case during the coming years. Where is the increased production of oil to come from? The Middle East and Mediterranean countries appear to be the answer. The supremacy of the North Sea and Baltic countries based on coal may therefore give way to, or at least not greatly exceed, that of the Mediterranean area which may once again rise to greater economic status—as in the days of antiquity.

French and Italian refineries must play a leading part in this, though doubtless England will make a gigantic effort to prevent France taking leading rank among European refineries, and becoming an exporter even to the U.S.A. If it be admitted that the real petroleum reserves of the world are ten times those so far proven, and that increase in power demands will not be more than 5 per cent per annum, it seems probable that petroleum resources will be adequate at all events until the end of this century. The author concludes with some interesting speculations on power economics, including coal hydrogenation, agricultural power sources, and atomic energy.

Beryllium Toxicity Studies

STUDIES on the characteristics and treatment of beryllium poisoning carried out by Merck and Company, of America, indicate that the type and seriousness of the reaction produced in the body is influenced strongly by the solubility of the beryllium compound. The more soluble compounds, particularly those with a strongly electronegative group such as fluoride or sulphate, are likely to produce the acute disease, while the less soluble compounds will probably cause chronic disease instead. This may explain the long interval sometimes experienced between exposure and the appearance of clinical symptoms in chronic cases. However, the pattern of the disease varies widely.

Treatment with cortisone produces improvement of symptoms and metabolically. On cessation of treatment, however, the nodular shadows on the X-ray plates return, if not quite so seriously as before. Moreover no substance is yet known which will eliminate beryllium from the body once it has been ingested, and this makes the disease dangerous. The only effective remedy at present, as the report points out, is to ensure that in factories working with beryllium the concentration of the element is kept at the lowest possible level. Concentrations of 1-2 micrograms per cu. ft. are generally considered to be safe for working conditions, but in the present state of knowledge any exposure at all should be considered hazardous.

Co-operation in America

State to Help Protect Public

TO stimulate satisfactory uniform labelling of chemical products, a Public Health Service Committee is being reactivated to work with the American Manufacturing Chemists' Association, it was announced recently.

'Since the 1930's when agreements between the Public Health Service and certain chemical manufacturers were drawn up,' Dr. Leonard A. Scheele, Surgeon General of the Public Health Service, said, 'the use of potentially hazardous chemicals has greatly increased, and many new products not covered by the agreements have been introduced. It is therefore necessary to reappraise current needs and to take new steps to meet today's problems.'

Agreements with manufacturers of methanol, carbon tetrachlroide, and other chlorinated hydrocarbons, carbon disulphide, aniline, benzene, and chlorinated naphthalenes, diphenyls and diphenyl oxides, covering warning designations to be used on containers, are now therefore being discontinued, Dr. Scheele said.

Commending the work of the Manufacturing Chemists' Association through its Labels and Precautionary Information Committee, Dr. Scheele indicated that the Public Health Service endorses the principles of labelling as set forth by the association.

'The identification of potentially hazardous materials through proper, uniform labels is vital to the public health,' Dr. Scheele stressed. 'State regulatory agencies have been looking to the Manufacturing Chemists' Association and the Public Health Service for the development of guides. Through the reactivation of a Public Health Service advisory committee to the Manufacturing Chemists' Association and other agencies, we hope to provide effective safeguards where they are needed.'

This labelling programme, Dr. Scheele indicated, has been developed for bulk packages of chemicals intended for commercial use and in no way affects the provisions of the Federal Caustic Poison Act, which applies to some caustic and corrosive chemicals intended for household use, or the Federal Food, Drug, and Cosmetic Act, which requires adequate warnings on the labels of all drugs.

Canadian Chemical Project

FOUNDATIONS of a great new chemical project were laid on 10 September near the village of Varennes on the South shore, of the St. Lawrence, below Montreal, when construction was officially begun of a $3,000,000 plant for a new chemical company, St. Maurice Chemicals, Ltd.

The new concern is the result of American and Canadian co-operation, the chairman of the board being John P. Remensnyder, president of the Heyden Chemical Corporation, New York, and the president, V. G. Bartram, president of Shawinigan Chemicals, Ltd., Montreal.

St. Maurice Chemicals is expected to be in production by next spring with an annual capacity of 30,000,000 lb. of formaldehyde and 3,000,000 lb. of pentaerythritol, neither of which has been previously manufactured in Canada.

Process design for the plant was executed by the Heyden corporation, while the engineering and construction is being carried out by the Shawinigan company. Most of the equipment required is being manufactured in Montreal.

Linseed Oil Imports

AS announced by the Ministry of Food on 6 September, it has been decided to end the buying on Government account of linseed and linseed oil from overseas. Private imports from any source will be permitted as from 1 January, 1953. For the time being licences will be granted for the import of 1 ton of linseed oil or 3 tons of linseed for every 3 tons of linseed oil purchased by the applicant from the Ministry of Food after 6 September, 1952. The ratio of permitted imports to purchases from the Ministry of Food will be reviewed from time to time in the light of the rate of disposal of Ministry stocks.

Applications on this basis should be made separately for linseed and linseed oil on Form ILB/A (Revised) and should be sent to the Board of Trade, through the Ministry of Food (Oils and Fats Division), London Road, Stanmore, Middlesex.

The licences will be available for imports from any country from 1 January to 30 June, 1953. Importers will be asked to submit periodical returns showing the quantities of linseed and linseed oil imported against the licences issued to them.

Genesis of Lung Cancer

Domestic Smoke an Important Factor

IN THE first of a series of 'Progress Reports' at the conference of the National Smoke Abatement Society at Portsmouth on 24-26 September, Dr. Percy Stocks, Senior Research Fellow of the British Empire Cancer Campaign, and formerly Chief Medical Statistician of the General Register Office, gave some interesting results of statistics on the incidence of lung cancer and its relation to atmospheric pollution.

Saying that an important factor in the genesis of increasing deaths from lung cancer in this country and the U.S.A. had been shown to be tobacco smoking, Dr. Stocks said that it was not the only factor. Statistical evidence could now be advanced in favour of the view that atmospheric pollution by some carcinogenic substance present in smoke from domestic chimneys may be an additional factor.

Smoke *v.* Sun

In an earlier report, said Dr. Stocks, he had shown that there were high death rates from lung cancer in London and certain other large cities, with a steep downward gradient from London, through large and small towns, to rural districts. There was a correspondence between cancer death rates and sunshine record figures, and it had been suggested either that smokiness of the atmosphere was an important factor in itself in promoting cancer of the lung, or that sunshine was an important factor in preventing its incidence. It was now known that a cancer-producing substance, produced by the domestic burning of coal, is benzpyrene, which is found in the air of our towns, the amount present increasing in the winter and with the size of the town.

Recent investigations had shown, said Dr. Stocks, that the lung cancer death rate also increased in a large town with the density of population, or number of domestic chimneys per acre. In the area of Greater London the prevailing wind would shift the point of greatest smoke density towards the north east, and examination of the cancer mortality map of the area showed that the highest deaths were, on this basis, where they would be expected.

Dr. Stocks emphasised that much of what he had said was so far conjectural, but it was being tested by field research, and that it was safe to say that 'the statistical facts we have extracted so far fit in rather well with the hypothesis that atmospheric pollution by domestic smoke is an important factor in the genesis of lung cancer, and that tobacco smoking is superimposed upon it as another important factor.'

White Lead Films

A PRIVATE showing of two new films, 'White Lead' and 'Magnet—A White Lead Paint' was held at the Hammer Theatre, Wardour Street, London, on Tuesday, 23 September. The films were sponsored by Associated Lead Manufacturers Ltd., a single company formed in 1949 'by the amalgamation of the manufacturing facilities, technical experience and research resources of a number of companies.' They were made by World Wide Pictures Ltd., in collaboration with Cecil D. Notley Advertising Ltd.

Although they are advertising films and will be shown together to paint specifiers and users in order to encourage the use of white lead paints, it is thought that the first film 'White Lead' may be of interest to technical schools, apprentice training schemes and for shows of a technical nature to general audiences. Copies may be had on loan on application to any office of Associated Lead Manufacturers Ltd.

'White Lead' runs for 20 minutes and shows the mining of lead ores and the conversion of purified pig lead into white lead by the old chamber process and by the modern Octagon process. It then goes on to show how dry white lead and white lead ground in oil are prepared. The second film is in Kodachrome and runs for 16 minutes. It shows the manufacture of a white lead base hard gloss paint called Magnet and a decorator advances his arguments as to why he thinks 'Magnet' is a most economical paint.

Imports Ban Sought

The Pakistan Tariff Commission is holding an inquiry into the claims of the local sodium silicate industry for protection. It is understood that the local manufacturers have demanded the banning of imports of sodium silicate from all countries as they claim they can meet Pakistan's present and potential needs. There are 16 factories in Pakistan producing sodium silicate, with an estimated capacity of 52,000 tons a year.

The Chemist's Bookshelf

CONCISE PHYSICAL CHEMISTRY. By J. E. Wynfield Rhodes. 1952. English Universities Press, Ltd., London. Pp. VII + 196. 12s. 6d.

This is an elementary book written for first year medical and science students and the like. It is, very strictly, an introduction to the subject of Physical Chemistry. A considerable number of text-books have already been written at this level, but there are few good ones. This is not really surprising, for the art of clear and simple exposition is elusive. To practice it successfully a rare combination of qualities is needed, and paramount among these is much teaching experience. Only after prolonged and acute observation of the misconceptions which are apt to afflict the mind of the neophyte can a would-be author begin to hope for success. But finally to realise this hope requires more than diagnosis and anticipation of difficulties; it demands skill and imagination in the treatment, a good pedagogic 'bedside manner.'

That Dr. Wynfield Rhodes possesses the necessary experience appears in the first line of the preface to the book, which, we are told, 'has evolved out of nearly thirty years of experience in teaching physical chemistry to technical college students.' The book itself provides ample evidence that he also has in rare measure the qualities needed to exploit such experience.

The only sure way of mastering the discipline of any subject is to practise it; the best way of learning and understanding the principles of physical chemistry is to make use of them. It follows that perhaps the greatest service a teacher can do a student is to introduce him to the principles and then show him clearly how to apply them. That is what Dr. Rhodes has done for those beginning to study physical chemistry. No opportunity has been lost to illustrate and illuminate with typical numerical examples. Indeed, the 'worked examples' are perhaps the most admirable feature of a generally lucid and logical treatment. In addition, the author has, at the end of the book, cleverly constructed a list of questions, the answers to which summarise in logical sequence all the important points a student needs to understand and remember. This is a novel and noteworthy technique.

The book deals adequately with all the important topics that first year students should know about, it is very well produced, has a good glossary of physico-chemical and physical terms, and both a name and subject index. The diagrams are elegant and instructive and there are no serious misprints. The price demanded is a modest request for what is offered in return.—H. MACKLE.

INDUSTRIAL PROCESS CONTROL BY STATISTICAL METHODS. By John D. Heide. McGraw-Hill Book Co., New York and London. 1952. Pp. 297 + ix. 51s.

Books of the McGraw Hill Industrial Organisation and Management series are well known and widely used in the U.S.A. They are perhaps not so well known and certainly not so widely read in this country. This latest addition to the series deserves to be studied carefully by anyone concerned in the control of industrial processes. It is stated in the introduction that the book deals with 'that phase of industrial statistics pertaining to the direct control of the industrial processes.' It does in fact do more than this, for it provides a complete introduction, with the minimum of mathematical language, to the general subject of statistical analysis and illustrates the application of such analysis to control problems. After a brief introductory chapter and an account of methods of presentation of data the author deals in successive chapters with Progress Frequency Distributions, Control Charts, Limit Lines, Operating Specifications, Technical Problems, Study of Process Data, Factory Installations, Practical Programme Aids, Factory Interpretation of Charts, Organisation and Administration, Quality Reporting and Quality Rating, and Evalua-

tion of Test Procedures and Test Results. Each new term introduced is carefully defined and illustrated so that the text can be followed readily by students and industrial workers previously unacquainted with the subject.

The text is extremely readable and wide use is made of illustrative examples. The subject is approached from a practical view point, the examples being chosen from a very wide range of industrial applications. Each chapter is followed by a group of exercises, again chosen from actual industrial problems, which amplify the examples worked out in the text. In addition to providing a graded course of study for the student this also enables a technical man to compare his own problem with many similar problems from other industries.

Essentially the book is designed to enable a factory or plant manager to install a programme of statistical quality control and to operate and administer an established programme. To this end the book is complete in itself the necessary background of statistical analysis being provided in such a manner that a minimum of mathematics is required. —F.M.

REVIEWS OF PETROLEUM TECHNOLOGY. Vol. 12. The Institute of Petroleum, London. Pp. 513. 50s.

'Something over one-third of all chemicals produced in the U.S.A. are derived from petroleum and about one-third of this production is done by oil companies.' The quotation is from the introduction to the chapter entitled 'Chemicals from Petroleum' and the period referred to is the year 1950. These fractions appear to the casual observer extraordinarily high, but the rise of the petroleum chemical industry in the U.S.A. has been very rapid indeed, and with the building of large new refineries in this country we may anticipate a similar if smaller expansion. With this aspect in mind it can be seen that these annual reviews are of the greatest interest, not only to those directly connected with the petroleum industry, but also to everyone engaged in the manufacture or use of aliphatic chemicals.

The present volume has over 150 pages more than its predecessor, and as before covers the whole range of the industry from geology to engine testing. The chapter dealing with the production of plastics was, however, surprisingly short, and the material diffuse and general. This may have been due to the fact that some of the material relevant to this subject, such as the production of phenol by direct oxidation of benzene and the resins from styrene and polyesters were buried in other chapters, but the treament appeared perfunctory.

One of the more interesting references in the chemical section was that dealing with the production of methanol by reacting methane with sulphur trioxide. Methane is one of the less tractable raw materials, but one of which there is an assured supply. Reactions of this type are almost the only alternative to conversion to acetylene by the electric arc process.

As in previous volumes the material has been very efficiently indexed. At the end of each chapter there is a list of references (over 3,000 in all) and in addition there are separate name and subject indexes at the back of the book.—J.R.M.

Microchemical Methods

A NEW course of 12 lectures designed to survey the principal branches of chemistry in which small-scale methods have been successfully applied will be held next year at Norwood Technical College, Knights Hill, West Norwood, London, S.E.27.

The lectures, under the department of chemistry and biology, will be held on Saturday mornings from 9.15 a.m. to 12.30 p.m., and will begin on 10 January, 1953.

Demonstrations will be given to illustrate the series which will deal with the following topics:—

Scope, aims and achievements of small-scale techniques; design and construction of simple apparatus; organic and inorganic preparations on a reduced scale; simple chemical microscopy; inorganic qualitative analysis; volumetric and gravimetric analysis on a reduced scale; organic qualitative and quantitative analysis; physicochemical methods of analysis; microtechniques for the determination of molecular weight, and so on.

As the course is of an essentially practical nature, the apparatus used will, in the main, be either easily constructed or normally at hand.

Application forms for admittance to the course may be obtained from the secretary of the college. The London fee for the course is £1.

HOME

Distributors of DDT

As from 1 October, 1952, the Pharmaceutical Laboratories, Geigy, Ltd., Rhodes, Middleton, Manchester, will be directly responsible for all distribution of DDT/Geigy. This is the result of an amicable arrangement with Stafford Allen & Sons, Ltd., who have in the past been acting as distributors of DDT to the chemical trade.

Record Steel Output

Steel production in September reached a record annual rate of 17,149,000 tons compared with a rate of 15,749,000 tons in the same month of last year, and exceeded the previous September peak rate of 16,964,000 tons achieved in 1950. The basis of this achievement was increased pig-iron production which also reached a record figure in September at the annual rate of 10,845,000 tons. This expansion was largely due to the coming into operation of four new blast furnaces, which were part of the industry's 1946 development plan.

Prices of Oils & Fats

There will be no change in the prices of unrefined oils and fats and technical animal fats during the four-week period ending 1 November. Prices of refined oils and imported edible animal fats for the eight-week period ending 29 November also remain unaltered.

High Vacuum Equipment in Scotland

To meet the growing demand in Scotland for high vacuum applications a new establishment has been opened in Glasgow, by W. Edwards & Co. (London), Ltd. Facilities for technical service and sales are now available at 44 West George Street, where it is intended also to have a selected range of equipment available for inspection.

Suggestions Invited

As it is nearly three years since the committee of the Midlands Society for Analytical Chemistry ascertained the wishes of members with regard to subjects for discussion, it is felt that some changes may have arisen. The committee would therefore welcome any fresh ideas for discussion topics (preferably in writing), for the new session which begins on 14 October.

Change of Name

The British Association of Chemists has moved and is now located at 14 Harley Street, London, W.1. The telephone number is Museum 7021.

Technical & Scientific Register

The total number of persons enrolled on the Technical and Scientific Register on 11 August, 1952, was 5,692. This included 4,064 registrants already in work but who desired a change of employment and 1,628 registrants who were unemployed. Vacancies notified during the fourweek period 15 July to 11 August totalled 384. During the period 123 vacancies were filled and 400 were cancelled or withdrawn. From 13 May to 11 August the number of vacancies filled was 384 men and 28 women, of whom 25 men and one woman were placed overseas.

Fire Extinguisher Approved

Negotiations over the last five years have resulted in the acceptance in the U.S.A. of a pressure-operated fire extinguisher manufactured by Nu-Swift, Ltd. This is the first foreign-made fire extinguisher ever approved for use in America and its recognition on behalf of the Associated Factory Mutual Fire Insurance Companies opens up a considerable dollar export field.

Powell Duffryn, Ltd.

The widespread activities of Powell Duffryn, Ltd. were reviewed by Sir Herbert Merrett, the chairman, in his statement at the annual meeting of the company held in London on 24 September. Particular reference was made to the satisfactory progress made in the construction of the Vacuum Oil Company's refinery at Coryton, which was expected to be in full production by midsummer of 1953. Chemical engineering plant of first class quality was being produced by Powell Duffryn Carbon Products, Ltd., which was largely concentrating on the manufacture of special appliances where acid resisting material was essential. Progress was also being made in the construction of the works in Chicago by the Delanium Carbon Corporation in which the company was partner with the Great Lakes Carbon Corporation of America.

OVERSEAS

Fertiliser Plant in Tasmania

A big fertiliser plant to produce half Australia's annual consumption of ammonium sulphate is being built in southern Tasmania at a cost of more than £A3,000,000, it is reported. The plant is being built by the Electrolytic Zinc Company of Australia, and it is hoped by the end of 1954 that it will be turning out 55,000 tons of ammonium sulphate a year. Ammonium sulphate is used in Australia principally as a fertiliser of sugar cane. A large percentage of the sugar industry's needs are at present supplied from overseas, but the new plant should give Tasmania a big export trade with Queensland, the sugar-producing State.

Alcoa Completes Smelter

The Aluminium Company of America (Alcoa) has completed its new aluminium smelter at Wenatchee, Washington, it is announced. Two lines of the new plant have been installed, with a total capacity of approximately 85,000,000 lb. annually, and another two lines are still to be installed. Electric power for the plant is being supplied from a dam development at Rock Island. The plant will cost an estimated $45,000,000, and is said to be the largest single investment of private capital made at one location at one time in the State of Washington.

No European Union

The Federal German Chancellor, Dr. Adenauer, told an international gathering of chemists at Frankfurt on 3 October that the six Schuman Plan countries do not intend to form a European Chemical Union. 'When we formed the Coal and Steel Union and set about creating a European Defence Community,' he said, 'we thought only of the possibility of arriving at necessary European co-operation. Now we want to digest this because we have stepped on to entirely new ground.'

Sulphite Plant Producing

The new sulphite plant being constructed by the Chilean Exploration Company in Chuquicamata is now partially in production, it is reported. At present, production is by superficial development of the oxides, but will be progressively increased as the construction is completed.

European Atomic Research

A research laboratory costing approximately £9,000,000, is to be built at Geneva by the European Council for Atomic Research, a ten-nations body sponsored by the United Nations Educational, Scientific and Cultural Organisation. The laboratory, which will take about five or six years to build will be devoted to pure scientific research. No experiments on atomic weapons will be carried out, nor even work on the industrial application of atomic energy. Results of the investigations will be available for publication in any country.

New Italian Gas Find

A new source of natural gas, which it is thought may prove to be the largest field yet found in Italy, has been discovered by Agip, the Italian State oil corporation at the mouth of the Po valley, near Ravenna. The first drill is reported to be producing 5,200,000 cu. ft. of natural gas a day, more than any other drill in Italy, including the Cortemaggiore gas fields.

Indian Research in Silk

Dr. S. S. Bhatnagar, Secretary, Ministry of Natural Resources and Scientific Research, recently laid the foundation stone of the building which will house the offices of the Silk and Art Silk Mills' Research Association. The building is designed to have nine storeys and will be 101 ft. high. Apart from the office of the association, it will have a silk library, a meeting hall, a silk club and retiring rooms. The association has also acquired a site for a building to house its laboratory, which is expected to cost about £187,500.

U.S. Chemical Merger

The merger of E. R. Squibb & Sons into the Mathieson Chemical Corporation received overwhelmingly favourable support from stockholders of both companies at the special meetings held on 30 September. The merger is considered to be one of the most important to take place in the chemical industry in recent years. E. R. Squibb & Sons will operate as a separate division of Mathieson retaining the policies and standards of this 90 year-old pharmaceutical and drug products house.

· PERSONAL ·

PROFESSOR W. E. GARNER, Professor of Physical and Inorganic Chemistry, has been appointed Pro-Vice-Chancellor of Bristol University on the retirement of PROFESSOR G. C. FIELD.

The Lord President of the Council has appointed SIR WALLACE AKERS, C.B.E., F.R.I.C., and SIR PHILIP JOHNSON to be members of the Advisory Council for Scientific and Industrial Research. The appointments date from 1 October.

Sir Wallace Akers is a director of Imperial Chemical Industries, Ltd., and Sir Philip Johnson is a director of Hawthorn, Leslie & Co., Ltd. and chairman of the Parsons and Marine Engineering Turbine Research and Development Association.

PROFESSOR P. I. DEE retired from the Council on 30 September, 1952, on completion of his term of office, and SIR HUGH WARREN has resigned his membership of the Council because of the pressure of other duties.

MR. DENYS BROOK-HART, M.C., M.I.A.M.A., A.M.Inst.Pet., has relinquished his appointment as Director of Public Relations to Petrocarbon, Ltd., Petrochemicals, Ltd., and the Manchester Oil Refinery, Ltd., group of companies, in order to form his own company under the title The D. Brook-Hart Company.

The new company started operating on 1 October, and its offices are at Premier House, 48 Dover Street, London, W.1. The aim of the company is to offer a comprehensive publicity service using all media (including publication production, editorial, Press relations, advertising, design, display, etc.). Among its clients are Manchester Oil Refinery, Ltd., and Petrochemicals, Ltd.

MR. SYDNEY F. SMITH, development engineer at Fort Dunlop, who was responsible for one of the first civil defence schemes in industry, has succeeded Major F. Monk as the Dunlop's chief safety officer for Great Britain. After taking an administrative course at the Home Office Civil Defence College, Mr. Smith organised training in all Dunlop's home factories and sales depôts.

It was announced by MR. E. A. O'NEAL, Jnr., chairman of Monsanto Chemicals, Ltd., at a meeting of the board of directors that MR. PHILIP A. SINGLETON, acting managing director, has been appointed managing director of the company and DR. W. D. SCOTT has been appointed assistant to the chairman with particular responsibility for the co-ordination of the company's activities in the Commonwealth.

MR. PHILIP A. SINGLETON joined the Monsanto organisation in 1940 and in 1945 was elected assistant to the president. In 1949 he was elected vice-president of the Nealco - Monsanto Company in Boston, later transferring to St. Louis as assistant director of Monsanto Chemical Company's foreign department. He was appointed a director of Monsanto Chemicals, Ltd., in 1951 and has served as a member of its policy committee.

Mr. Singleton

DR. W. D. SCOTT joined Monsanto Chemicals, Ltd., in 1936 as a research chemist, in 1942 he was appointed chief chemist in charge of research, development and patent activities and was elected to the board of directors in 1948. He is a director of Forth Chemicals, Ltd., and Monsanto Chemicals (Australia), Ltd.

Dr. Scott

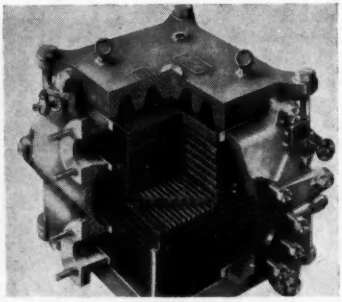
MR. L. CLARKE, of the technical Department of Imperial Chemical Industries, Ltd., Billingham-on-Tees, has left England to take up an appointment as research manager with African Explosives and Chemical Industries, Johannesburg, an associate firm of I.C.I. Mr. Clarke joined the I.C.I. Alkali Division in 1929.

Publications & Announcements

WITH the continual increase in live steam temperatures, boiler pressures and turbine outputs, the requirements for the feed water have also become much more exacting. The problem of producing from the available raw water make-up feed water that is as pure as possible is discussed by W. H. Stahel in an article 'The Use of Vapour Washers for the Evaporators of Steam Power Plant,' in the *Escher Wyss News* (Vol. 23/24, 1950/51), published by Escher Wyss, Ltd., Zurich, Switzerland. Chemical softening processes by means of precipitation; base exchanger; partial desalting by means of hydrogen exchanger and full desalting by cation and anion exchanger are described. In practice, a combination of various processes is usually employed, for example chemical softening as a first stage, followed by evaporation of the softened raw water. Other articles include 'The Non-destructive Investigation of Surface Defects,' and 'Grinding Plants for the Cement Industry.'

* * *

A NEW British carbon material, which offers the chemical engineer an effective tool to assist in solving problems associated with



Cut-away section of the Powell Duffryn cubic heat exchanger

all unit operations that have to be carried out under corrosive conditions, is 'Delanium' produced by Powell Duffryn Carbon Products, Ltd., at its specially equipped works at Hayes, Middlesex. Among the specialised equipment designed to make full use of the qualities of 'Delanium' is the Powell Duffryn cubic heat exchanger described and illustrated in the company's brochure No. C.5/52. The heart of the unit consists of a block or cube of 'Delanium' graphite perforated by a series of holes running through the block in alternate rows at right angles to each other. The graphite cube is placed under heavy compression by cast iron clamping plates so that the 'Delanium' graphite material is heavily pre-stressed, and even when in operation retains a nett compressive stress. The graphite cube is thus like a honeycomb through which liquids or gases to be heated or cooled are passed, separated from the heating or cooling medium by only a high conducting graphite wall. The path of flow for the process fluid, through the graphite block, is controlled by a pair of cast iron headers, bolted to two opposite faces of the graphite block. On the side exposed to the corrosive fluid, the cast iron headers are protected by a lining of carbon, rubber, or ebonite, and the gaskets employed are either rubber or asbestos graphite.

* * *

A SEAL suitable for use in small low pressure centrifugal pumps and other rotary equipment handling oil, water, and other fluids at temperatures up to 100°C., is the Morganite Postive Drive Unit Seal described and illustrated in its latest pamphlet (SD.45), by the Morgan Crucible Company, Ltd. Of simple and robust design the unit seal consists of a Morganite carbon sealing ring on to which is bonded a flexible rubber casing. Inside the casing is a stainless steel spring, ensuring adequate sealing pressure. This assembly is an easy push fit into a pressed brass driving cup, having indentations into which the driving lugs on the carbon ring engage when the seal is compressed to its working length. The brass driving cup is in turn a press fit into the customer's housing. This positive drive feature ensures that no torque is transmitted through the rubber casing of the seal. Once the seal has been fitted, renewal of the sealing ring with rubber and spring can be easily effected.

Law & Company News

New Registrations

Tar Products Trading Co., Ltd.

Private company. (511,792). Capital £5,000. Manufacturers and distillers of any kind of pitch obtained from coal and any kind of coal tar and coal tar products and petroleum and petroleum products. Directors: J. Veitch, A. T. Dixon. Reg. office: Commercial Union Buildings, 47 Pilgrim Street, Newcastle-on-Tyne, 1.

Walker Ward (High Wycombe), Ltd.

Private company. (511,635). Capital £1,000. Manufacturers, exporters and importers of analytical and pharmaceutical instruments, electronic equipment, etc. First directors to be appointed by the subscribers. Reg. office: 64 Aldermanbury, E.C.2.

Rylatt's Colours, Ltd.

Private company. (511,901). Capital £1,000. Manufacturers of chemicals, colours, and dyestuffs. Director: Mrs. R. H. Rylatt. Reg. office: Candas, Bryn y bia Road, Craigside, Llandudno.

Change of Name

The following change of name has been announced:—STERLING CHEMICAL DYES & COLOURS, LTD., to STERLING CHEMICALS CO., LTD.

Company News

Glaxo Laboratories, Ltd.

Subject to completion of audit profits of the Glaxo Laboratories, Ltd. group for the year ended 30 June, 1952 are announced as £1,585,000 (£1,333,000) after providing for all charges including taxation. The directors propose to place to future research and development reserve £150,000 (same); obsolescence and replacement reserve £250,000 (same); exchange reserve £200,000 (nil); general reserve £500,000 (£555,464). A final dividend on ordinary stock of 20 per cent is recommended. The directors also announce that it is proposed to capitalise £796,350 of the company's reserves (subject to the consent of the Capital Issues Committee), and to issue to the ordinary stockholders one share of 10s. in respect of every 10s. unit now held by them. In the opinion of the directors the current trading position is less favourable than in the past financial year. Annual general meeting, Charing Cross Hotel, London, W.C., on 5 December.

Quickfit & Quartz, Ltd.

Speaking at the annual general meeting of the Triplex group of companies in London on 24 September, Sir Graham Cunningham, chairman and managing director, said that the subsidiary company, Quickfit & Quartz, Ltd., had increased its turnover from £252,531 to £344,982.

'The additional building for which permission was given by the appropriate Government Department last year, has now been completed and is already partly occupied,' said Sir Graham. 'Furthermore, some other surrounding land and buildings have been acquired and are now being rapidly adapted to provide for further expansion of this prosperous subsidiary.

'We are in close touch with some of our Commonwealth and foreign agents and distributors, and look forward to an expansion of our export business in both chemical plant and laboratory ware as the years progress,' Sir Graham added.

Market Report

LONDON.—The general tone of the markets has been rather better during the past week although the volume of business in the aggregate has not been appreciably greater. Some improvement has been reported in the demand for chemicals for the textile, bleaching and dyeing trades, but buyers are exercising caution. A fair inquiry for export is in circulation. With the exception of some of the non-ferrous metal compounds values throughout the market are well held at unchanged rates. Since the re-opening of the London Metal Exchange two reductions have been made in the basis prices for dry white lead and dry red lead. Quotations as from 3 October were as follows:—Dry white lead £147 per ton, ground £168 15s. per ton; dry red lead £132 10s. per ton, ground £158 10s. per ton; dry orange £144 10s. per ton, ground £170 10s. per ton; Litharge £132 10s. per ton. A quiet but steady home trade has been reported from the coal tar products market with export business remaining difficult in the face of strong competition.

Next Week's Events

MONDAY 13 OCTOBER

Society of Chemical Industry

London: London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 7 p.m. Fine Chemicals Group. Professor F. E. King (Nottingham University): 'Synthesis of Simple Peptides.'

Leeds: University, 7 p.m. Yorkshire Section. R. Stewart: 'Agricultural Aspects of Fertiliser Production.'

Incorporated Plant Engineers

Dundee: Mathers Hotel, 7.30 p.m. W. B. S. McLean: 'Safety First.'

TUESDAY 14 OCTOBER

Society of Chemical Industry

London: Royal College of Science, South Kensington, S.W.7, 2.30 p.m. A. W. Marsden (Commonwealth Bureau of Dairy Science, Shinfield): North American Dairying.'

Institution of Chemical Engineers

London: Burlington House, Piccadilly, W.1, 5.30 p.m. Professor D. M. Newitt (past president), J. F. Richardson (Associate Member), R. H. Clark and D. E. Charles: 'Pneumatic Conveying, Part I—The Pressure Drop During Horizontal Conveyance.'

Incorporated Plant Engineers

Manchester: Engineers' Club, Albert Square, 7-15 p.m. C. W. Sutcliffe: 'Power Factor Correction.'

Midland Society for Analytical Chemistry

Birmingham: University, Edmund Street, 7 p.m. Discussion: 'The Application of Absorption Spectroscopy to Analysis.' Introduced in two parts. C. E. Kendall will speak on the uses of ultra-violet and visible absorption spectroscopy in qualitative and quantitative analysis: W. H. T. Davison will discuss general principles, techniques and applicability of infra-red spectroscopy to analysis.

WEDNESDAY 15 OCTOBER

Royal Statistical Society

Newcastle-on-Tyne: 18 Louvain Place, 7 p.m. Industrial Applications Section, North Eastern Group. E. D. van Rest: 'Quality Control in the U.S.A.'

Institute of Fuel

Manchester: Engineers' Club, Albert Square, 2 p.m. Joint meeting with National Smoke Abatement Society. Dr. J. C. Weston (DSIR, Building Research Station): 'House Heating.'

Oil & Colour Chemists' Association

London: 26 Portland Place, W.1, 7 p.m. R. N. Wheeler: 'Epoxide Resins.'

Manchester Metallurgical Society

Manchester: Engineers' Club, Albert Square, 6.30 p.m. Presidential address by H. Allison (Metropolitan Vickers Electrical Co., Ltd.).

THURSDAY 16 OCTOBER

The Chemical Society

London: Burlington House, Piccadilly, W.1, 7.30 p.m. Tilden Lecture. Dr. D. H. R. Barton: 'The Stereochemistry of *cyclo* Hexane Derivatives.'

Royal Institute of Chemistry

London: City of London School, Victoria Embankment, E.C.4, 6.30 p.m. London and South-Eastern Counties Section with the Institute of Biology and the Institute of Physics. Discussion: 'The Place of the Scientist in Civil Defence.'

Society of Chemical Industry

Edinburgh: North British Station Hotel, 7.30 p.m. Edinburgh Section. Magnus Pyke: 'Application of Scientific Principles to the Manufacture of Yeast.'

London: 11 Chandos Street, Cavendish Square, W.1, 2.30 p.m. Microbiology Group. H. Proom and Dr. A. J. Woiwood: 'Application of Paper Chromatography to Microbiology.'

London: Building Centre, Store Street, Tottenham Court Road, W.C.1, 6 p.m. Road and Building Materials Group. A. C. Whiffin and W. I. J. Price: 'Road Problems Arising from Snow and Ice.'

Institution of Chemical Engineers

Chester: The Queen Hotel, City Road, 7 p.m. North West Centre, Graduates' and Students' Section. 'Chemical Engineering Theory and Practice in the U.S.A.'

FRIDAY 17 OCTOBER

The Chemical Society

St. Andrews: United College, 5.15 p.m. Joint meeting with St. Andrews University Chemical Society. Professor John Read: 'Alchemy and Art.'

Dundee: University College, 7 p.m. RIC lecture. Professor J. N. Davidson: 'Biosynthetic Pathways.'

Royal Institute of Chemistry

London: Connaught Rooms, Great Queen Street, W.C.1, 6.30 p.m. London and

South-Eastern Counties Section. 4th annual dinner-dance.

Society of Chemical Industry

Cardiff: University College, 7 p.m. South Wales Section. Lecture: 'Education of the Chemist.'

Institution of Chemical Engineers

London: Caxton Hall, Westminster, S.W.1, 6.30 p.m. Graduates' and Students' Section. Conversazione. 'The Development of a Chemical Engineering Project.'

Newcastle-on-Tyne: Chemical Engineering Department, Stephenson Building, Claremont Road, 6.15 p.m. North East Centre. Graduates' and Students' Section. A. J. Pringle (Associate Member): 'Gas Engineering.'

Society of Dyers & Colourists

Manchester: Textile Institute, 10 Blackfriars Street, 6.30 p.m. Series of short papers on: 'Radioactive Isotopes in Textile Technology.'

Institute of Physics

London: 47 Belgrave Square, S.W.1, 6.30 p.m. Industrial Radiology Group. Dr. L. Mullins (Kodak, Ltd.): 'The Physics of the Radiographic Image.'

SATURDAY 18 OCTOBER

Institution of Chemical Engineers

Birmingham: University, Edmund Street, 3 p.m. Midlands Branch. H. D. Anderson (Member): 'Some Aspects of Handling Phosphorus.'

Manchester: College of Technology, 3 p.m. North Western Branch. Stanley Robson (president); 'The Further Training of the Chemical Engineer.'

Trade Mission to Central America

A Government sponsored trade mission under the leadership of Brigadier W. H. Crosland, managing director of Parsons & Crosland, Ltd., will leave about the middle of November for a tour of Venezuela, Colombia, the Dominican Republic, Cuba, and Mexico. These countries are in the dollar area and the mission will explore methods by which the U.K. can increase its hard currency earnings by satisfying the needs of these developing markets. The mission is expected to spend about six weeks on the tour.

CLASSIFIED ADVERTISEMENTS

SITUATION VACANT

The engagement of persons answering this advertisement must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

AN ASSISTANT ENGINEER—age about 30—is required by **The Mond Nickel Co., Ltd., SWANSEA.** Applicants should possess a Degree in Mechanical or Chemical Engineering, and should have had several years of practical works experience. Duties will be concerned with maintenance, construction and development, and there is good scope for experience and advancement for a man of ability and drive. Salary according to age, qualifications and experience, but commensurate with the responsibility of the post. Applications, giving full details of qualifications and experience, should be addressed to the **WORKS MANAGER, THE MOND NICKEL CO., LTD., CLYDACH, SWANSEA.**

SITUATION WANTED

CHEMICAL WORKS ENGINEER, 48, College trained, wide experience assistant and chief engineer, desires change. Excellent references and health. **BOX No. C.A. 3168,** THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

FOR SALE

CHARCOAL, ANIMAL AND VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal-insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—**THOS. HILL-JONES, LTD., "INVICTA" MILLS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON," TELEPHONE 3285 EAST**

DELAFILA, THE INERT FILLER. Used in the manufacture of Fertilisers, Insecticides, Paints, Plastics and Insulating and Sealing Compounds. Prompt supplies in a wide range of fineness grades. **THE DELABOLE SLATE CO., LTD. DELABOLE, CORNWALL.**

FURNACES. GRADEC LTD. manufacture all types of electric furnaces for all temperatures up to 1400°C. Muffle furnaces to 1200°C., complete with controls, 8 in. by 2½ in. by 2½ in., £50 15s. 14 in. by 7 in. by 4½ in., £72. 11 in. by 7 in. by 7 in., £76.
Delivery ex-stock to 4 weeks. Enquiries please to:—**GRADEC LTD., 96, HACKNEY ROAD, LONDON, E.2.**

GRAVITY Roller Conveyor several lengths, Rolls. 2¾ in. diam. by 16 in. 3 in. centres. Good condition. **THOMPSON & SON (MILLWALL), LIMITED, CUBA STREET MILLWALL E.14.** (Tel.: East 1844.)

SCREENLESS PULVERIZERS for fine grinding of Chemicals. Also **CYCLONES, ROTARY VALVE FEEDERS.** Callow (Engrs.) Ltd. Kirkby Trading Est., Liverpool.

FOR SALE

STAINLESS STEEL F.D.P. Quality ¼ in. thick plate, welded construction horizontal cylindrical enclosed storage tank, 2,000 gallons capacity, 6 ft. by 12 ft. long, manhole inlet and outlet connections. Further details, **BOX No. C.A. 3169,** THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

1 Barron **"D" MIXER, TROUGH** 30 in. by 18 in. by 18 in. Vee-belt drive to 2 H.P. motor, 750 revs. 400/3/50. As new.
One Werner Type **MIXER, TROUGH** 36 in. by 30 in. by 28 in. Twin "Z"-blades, power tilted, fast and loose pulley drive.

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PHONE 98 STAINES

TWIN Z-BLADE MIXERS, 36 in. by 30 in. by 26 in., 21 in. by 21 in. by 17 in. and 16 in. by 16 in. by 14 in.; also Laboratory sizes.
Jacketed Cylindrical **MIXERS,** 8 ft. 6 in. by 5 ft. 9 in., 3 ft. 6 in. by 3 ft. 6 in. and 2 ft. by 2 ft.
Two **U-TROUGH MIXERS,** 6 ft. by 2 ft. by 2 ft.—400/3/50.
"WERNER" Jacketed **FIN-BLADE MIXERS,** up to 3 ft. by 2 ft. 6 in. by 2 ft. 6 in.
Unused **CALORIFIERS,** also "WEIR," "SERCK" and all-aluminium **CONDENSERS,** 245 and 130 sq. ft. tube area.
Unused 4,000-gal. **TANKS,** 15 ft. by 7 ft. by 7 ft., ⅛ in. plate (Enclosed.)
"COCHRAN" BOILER, 9 ft. by 4 ft., 850 lb. evap., 100 lb. w.p.
PUMPS, HYDROS, FANS, STILLS, DRYERS, OVENS, etc.
Send for lists of **MIXERS, TANKS, RADIATORS.**

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No. 200 One nearly new **WERNER PFLEIDERER JACKETED MIXER OR INCORPORATOR.** Low type with C.I. built mixing chamber. 28 in. by 29 in. by 27 in. deep, with double "U"-shaped bottom which is jacketed, and double fish-tail or fin-type agitators geared together at one side, with belt-driven friction pulleys, 34 in. diam. by 5 in. face, with hand-wheel operation and hand-operated screw tilting gear. Machine fitted with machine-cut gears, covers, gear guard, cast-iron baseplate, and measuring overall approximately 7 ft. by 6ft. by 4 ft. high to the top of the tipping screw

No. 209 One **HORIZONTAL "U"-SHAPED MIXER,** steel built, riveted, measuring about 8 ft. 3 in. long by 3 ft wide by 3 ft. 3 in. deep, with horizontal shaft, fitted with bolted-on mixing arms about 18 in. long by 4 in. wide, with intermediate breakers, and driven at one end by a pair of spur gears, with countershaft, fast and loose belt pulleys, outer bearing and plug cock type outlet at the opposite end, mounted on two cradles fitted to two R.S.J. running from end to end.

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600

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535—LENGTHS	12 in. diam.	12 ft.
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